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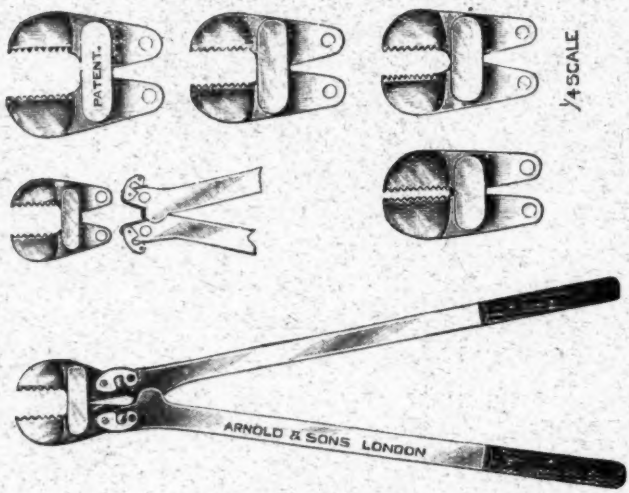

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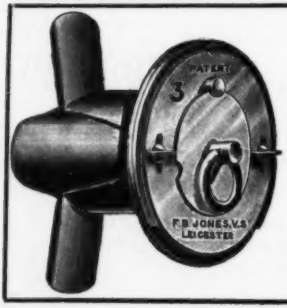

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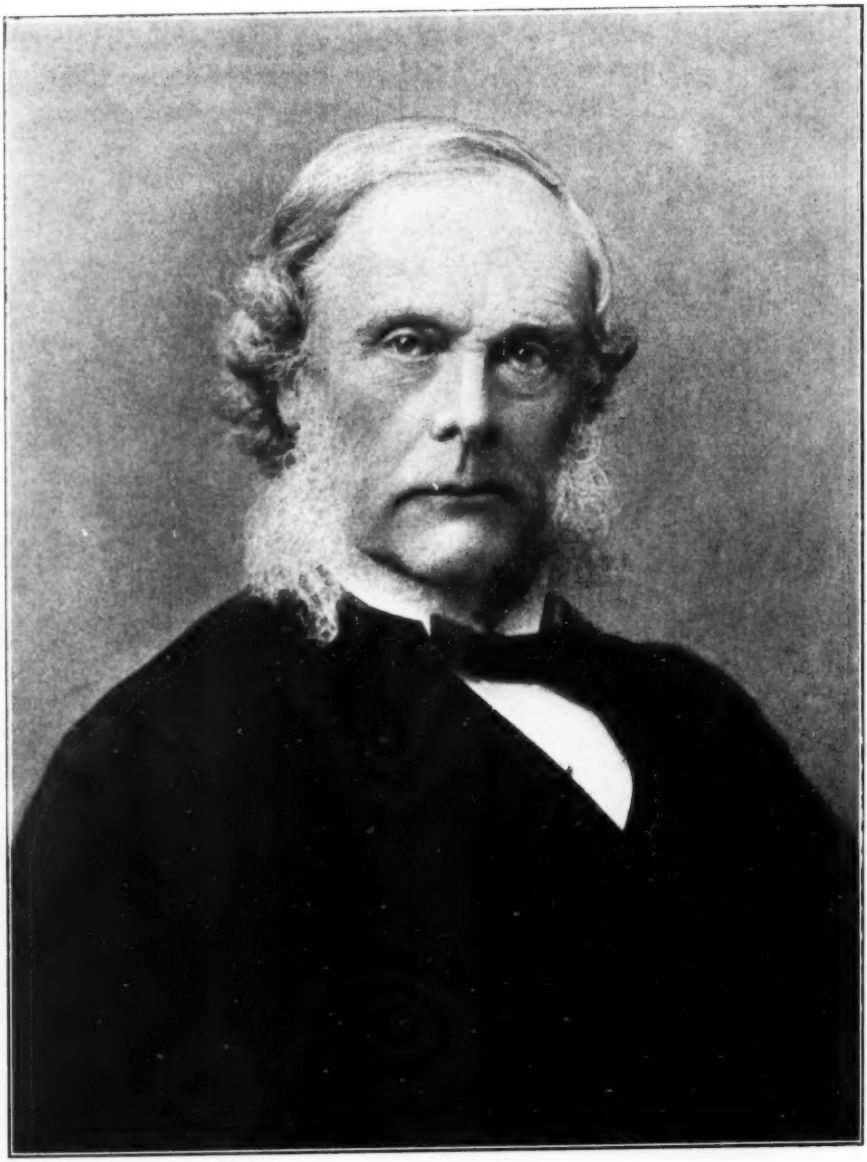

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THE

VETERINARY JOURNAL

MARCH, 1912.

LORD LISTER.

By the death of Lord Lister the world loses one of its brightest and most valuable ornaments. The number of human lives saved as the result of his work may be counted in hundreds of thousands, and, too, we of the veterinary profession may equally say that hundreds of thousands of our patients are relieved and their lives saved by the application of the teachings of the great master. Upon us, as well as upon our *confrères* in human medicine, the discoveries of Lister have conferred incalculable benefit, and we now successfully attempt operations which formerly led to certain death. The abdomen, the thorax, the bladder, and even the brain, can now be fairly said to be within the domain of almost everyday surgery, and it is entirely to Lister that this is due.

Born in 1827, he studied at University College, in London, and was admitted to the Fellowship of the Royal College of Surgeons. In 1860 he was appointed Professor of Surgery in the University of Glasgow, and it was whilst there that he applied the germ theory of Pasteur to the healing of wounds. His results were so striking that in a very short time he had converted the hospital rooms and wards, which used to be a hotbed of gangrenous and other bad sequelæ, into a healthy atmosphere where wounds healed readily and surgeons had no fear either to operate or to deposit their patients. His work is too well known to need comment, and all flesh, whether belonging to man or animal, has cause to revere his name.

Honours were showered upon him and he took them with the greatest modesty. First created a baronet, then a peer of the realm, he became a Privy Councillor, was decorated with the

Membership of the Order of Merit, made Knight of the Prussian "Ordre pour la Mérite," and received many other distinctions. He was elected President of the Royal Society, and held other honourable offices too numerous to mention.

With all his honours he was always modest, always approachable, willing to give advice, and always a man. It was good for humanity that such an one should be spared to a ripe old age and to see the fruits of his noble work.

Editorials.

A SIMPLE METHOD OF PURIFYING WATER.

It would no doubt be very difficult to over-estimate the value of a good and pure water supply for what we are pleased to term the lower animals as well as for man. There will probably always be some controversy concerning the alleged harmfulness of sewage contaminated water when taken into the alimentary tract of horses and cattle. However undesirable it may be, the fact remains that enormous numbers of animals are constantly drinking highly contaminated water with impunity, and it is a well-known fact that they will generally take water from a filthy pool in preference to drinking from a tank or cistern filled with comparatively pure water obtained from a municipal or other main supply. Be that as it may, we are not infrequently consulted about the water supply of various farms, and we should be loth to recommend the continued supply of highly contaminated water if a purer supply be obtainable. A pure water supply for a dairy farm is of paramount importance, not only for the cattle, but to ensure the proper cleansing of the various utensils employed in the handling of the milk and its products.

By a most simple method described on pp. 166-169 of this issue, by Drs. Nasmith and Graham, very highly contaminated water can be rendered pure in an almost incredibly short time by the addition of chlorine in the strength of one in a million. The chlorine is readily furnished by chloride of lime, which should contain at least 33 per cent. of available chlorine, and must therefore be fresh and not have been stored in porous or non-airtight packages. Obviously no method can be effective in the case of farm ponds or contaminated wells in which the source of contamination continues. In such cases the water can

easily be drawn off into a tank and allowed to stand a while for sedimentation of the grosser particles. It can then be syphoned off into a second tank, and there treated with the chlorine according to its capacity. In one instance quoted by the writers, which itself should carry conviction of the efficiency of the method, a well, containing seven hundred gallons of water with nine hundred and fifty bacteria per cubic centimetre, and including colon bacilli, was treated with one-sixth of an ounce of chloride of lime, producing a chlorine content of approximately one in two millions. "After chlorination there were only nine bacteria and no colon bacilli." An important point to note is that water so treated is tasteless and odourless on account of the great dilution, and all trace of free chlorine rapidly disappears.

The simplicity of the method and its reported efficacy render it worthy of the closest consideration in those places where the problem of obtaining pure water from a contaminated source has to be faced.

AN ACT SUPPORTING THE NEW VETERINARY BILL.

The new Veterinary Amendment Bill had a lot of its clauses deleted before it was presented to Parliament, and one clause in particular which received the strongest opposition related to the performance of certain operations upon animals by people who were not qualified veterinary surgeons. The new Act in regard to the Prevention of Cruelty to Animals has done for the profession exactly what the profession tried to do for itself, and it is now an offence "to subject animals to any operation performed without due care and humanity." In a case recently decided before a Brierley Hill Court, in which a farrier was heavily fined for operating upon the so-called "lampas" of a horse's gums, the magistrate is reported to have said: "People who were not properly qualified veterinary surgeons had to be very careful when they attempted to do anything in the way of any operations on horses. It must be made generally known in the district that if unqualified people attempted to perform operations on animals, now that this Act was in operation, they subjected themselves to a risk of six months' imprisonment." The wording of the verdict is very clear, and is an exact interpretation of the meaning of the Act which will very materially strengthen the hands of the profession and also of the various societies who make it their business to look after the humane side of the lives of our animals.

General Articles.

DIFFERENT METHODS OF CONTROLLING AND SECURING CATTLE FOR OPERATION.

By KHAN SAHIB SAYAD SARDAR SHAH GILANI,

Professor of Bovine Medicine and Surgery and Veterinary Obstetrics, Punjab Veterinary College, Lahore.

As it is necessary in the case of horses and other large animals to control them while standing, and to cast and secure them on the ground, so it is equally essential in the case of cattle when requiring to submit them to surgical operations, in order that the surgeon may safely, freely, and satisfactorily do what is required. The methods here described are designed to keep an animal under full control, in order to prevent him from injuring the surgeon and from spoiling and complicating the said operation. Sometimes an animal is apt to injure itself by becoming frantic through fright. Therefore, it is necessary to lay down certain rules for securing and controlling the patient before operating, so that he may lie quietly and not hurt himself, the surgeon, or the assistants. For this one requires methods which may be adopted quickly and easily, and, moreover, which are easy and handy ways of loosening and freeing the animal after the operation is over. Bearing in mind the above principles, I desire to bring to the notice of the profession such practical and useful methods as I have myself employed in my daily practice, which is a very large one, during the last twenty-four years. Even very heavy, strong, troublesome, and vicious animals are readily and completely mastered and managed by the adoption of these methods. I have read many books by European authors on the handling and surgery of domestic animals, but except for the ordinary method of throwing a bullock with a rope round his horns and abdomen, I have not come across any other improved form. I consider it most desirable to pay my tribute of gratitude to the European authors, from whose works I have gleaned knowledge, and it is with some diffidence that I venture to bring these methods of my own before their notice. To begin with, I have been surprised

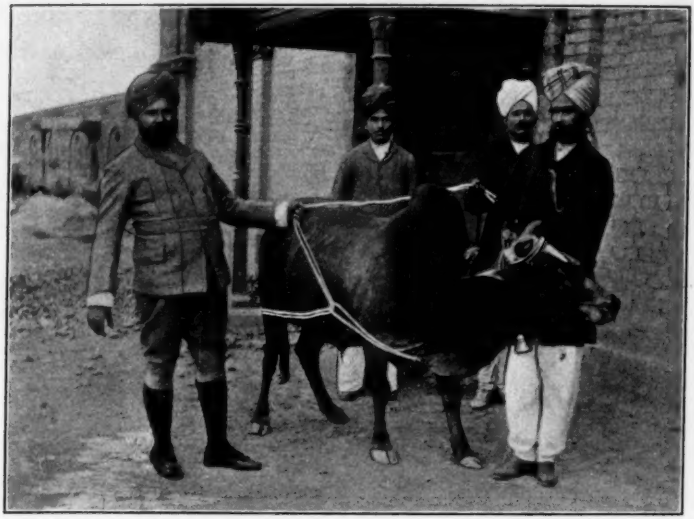

FIG. 1—Securing in standing position with double rope. First stage.

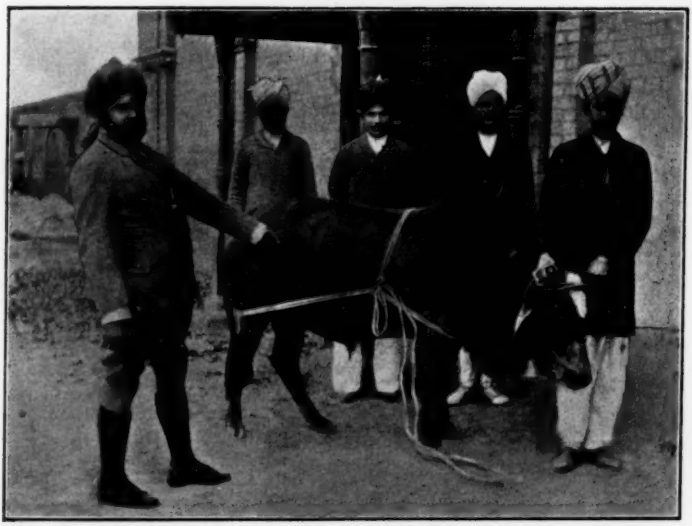

FIG. 2.—Second stage, showing the animal tied up and secured.

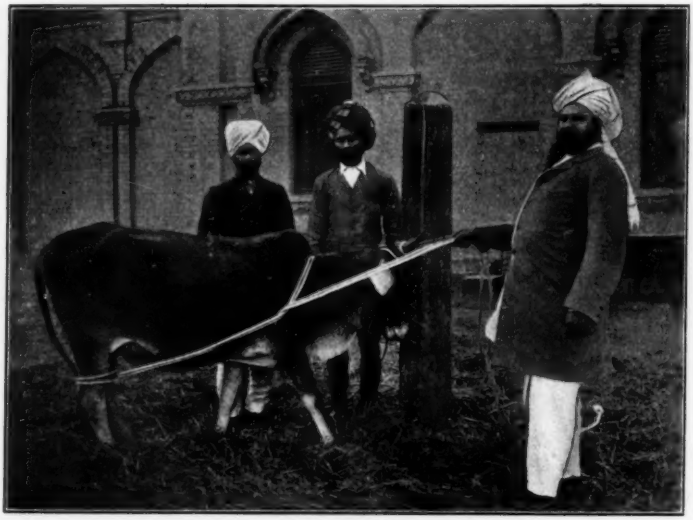

FIG. 3.—A simple way of controlling an animal in the standing position.

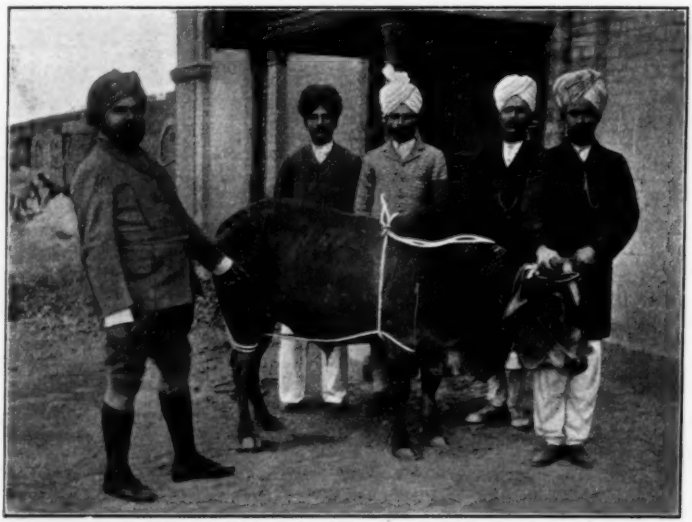

FIG. 4.—Second method of securing animal to prevent kicking whilst being dressed.

FIG. 5.—Third method. Side view of fixing the rope for dressing the scrotal region.

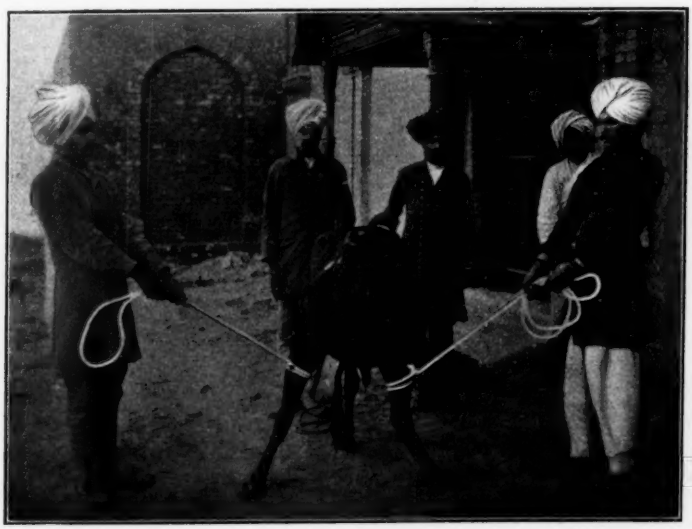

FIG. 6.—Third method—back view.

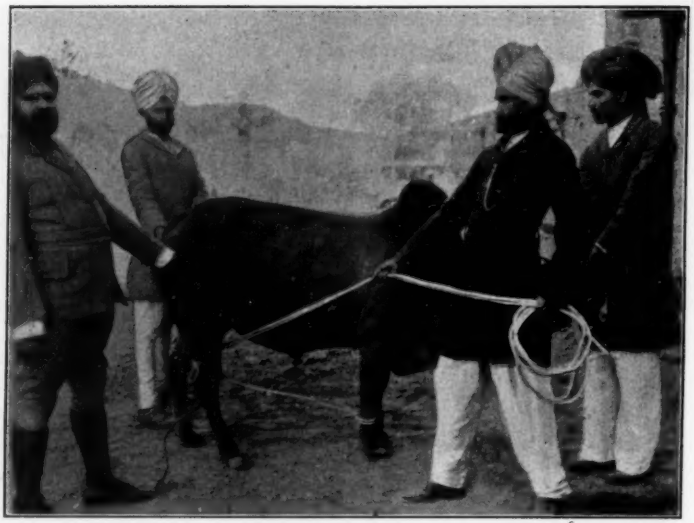

FIG. 7.—First method. For casting a strong bullock or buffalo. A piece of rope is passed around the hind legs above the hocks. A long double rope is fixed with one end on both fore fetlocks and passed between the hind legs and pulled forward. First stage

FIG. 8.—Second stage. The animal down with all four legs tied together.

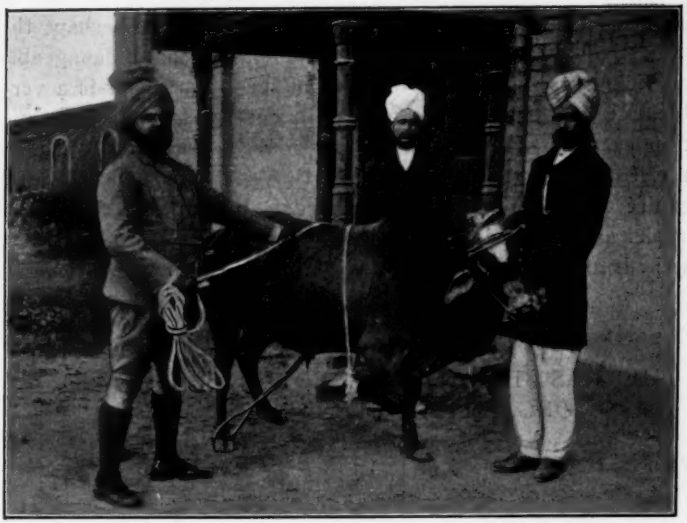

FIG. 9.—Second method of casting animal. One end of a long rope is tied on the right fore fetlock; the rope is then passed over the back and round the right hind fetlock—again passed over the loin to the right side. A gentle pull of one man will throw the animal on the right side.

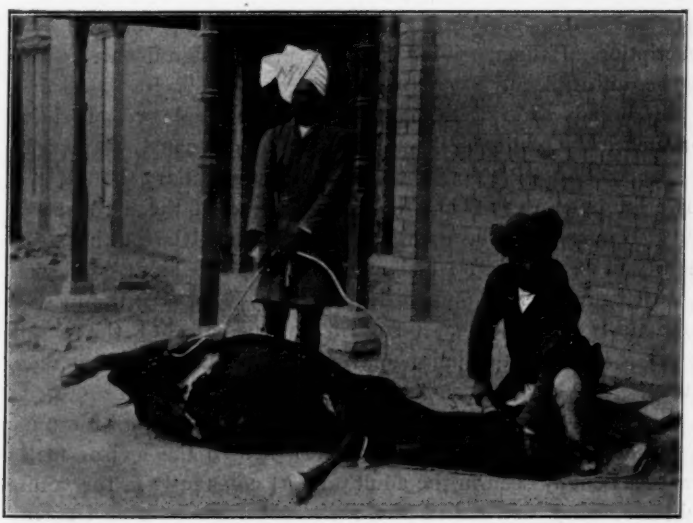

FIG. 10.—Second method—second stage.

to find such an important omission amongst the works of European writers, but it has occurred to me that perhaps the animals of European countries may not be so unmanageable and vicious as those here, for the buffalo in particular is a very obstinate and troublesome animal to control for an operation. It appears that no special attention has been paid to this subject in Europe, and it is possible that European surgeons may not require the adoption of such methods. I trust that the photographs and brief descriptions will prove useful, and if these methods are of some value I shall be well contented.

THE NASO-PALATINE APERTURES, JACOBSON'S ORGAN, AND STENSON'S CANAL.

By THOS. B. GOODALL, F.R.C.V.S., F.L.S.

Christchurch, Hants.

(*Formerly Examiner in Anatomy to the Royal College of Veterinary Surgeons.*)

Indexed B. A. C.

The terms "Incisor foramen," "Incisor cleft," and "Palatal opening" are used indiscriminately in works of anatomy, and lead to much confusion in the mind of the student, especially one just taking up the subject. Anyway, it was my own experience and that of many others known to me, so, perhaps, a brief description of them, giving each its proper significance, would not be out of place.

In McFadyean's "Osteology" (p. 88) we read: "The incis*or* foramen is in reality a short, mesially placed canal, formed by the apposition of the right and left premaxillary bones. Its posterior opening is found at the lower end of the hard palate, and it transmits to the upper lip the labial vessel resulting from the fusion of the palato-labial arteries of opposite sides."

In Chauveau's "Comparative Anatomy" (p. 589) the incis*ive* foramen is described as being in the passage of the single vessel formed by the union of the two branches of the palatal artery.

In Gray's "Anatomy" (p. 165): "One or two small foramina in the alveolar margin (of the palate), behind the incisor teeth, are occasionally seen in the adult, almost constantly in the young subject. They are called the *incisive foramina*, and transmit vessels and nerves to the incisor teeth."

In my view, and for the sake of uniformity of expression, the incisor foramina should always be understood to refer *only* to the foramina which are invariably present in the young subject, in which the permanent teeth are in the process of formation. They are seen, one immediately behind each of the deciduous incisors, and they are formed round the gubernacula of the tooth germs of the successimal teeth, where they have been proliferated from the tooth-band or enamel organ. They become larger towards the time of eruption of the permanent teeth, and mark the places where eventually the bone is absorbed for the passage into the mouth of the permanent teeth. (See Tomes's "Dental Anatomy," p. 127 and following, and my own article in the *Journal of Comparative Pathology* for June, 1895, pp. 132 and 133-9. In an illustration in that article these incisor foramina are clearly seen.)

If, then, we are agreed that these shall be called always the incis*or* foramina, from their relation to the incisor teeth, we might understand the incis*ive* foramen as applying only to that opening found in the equidæ and a few other mammals, generally only one mesially placed between the incisive or premaxillary bones, for the passage of the palato-labial arteries. Occasionally there are two, one on either side, which unite in the bone, and the arteries in these cases fuse in their passage through the bone.*

Having, then, made it clear what we imagine should be understood by the terms incis*or* and incis*ive* foramina, let us now briefly consider another opening, or, generally, a pair of openings, present in almost all mammals, between the premaxillary bones and the palatine plates of the maxillary bones, which have been given a multiplicity of names leading to some confusion.

In Chauveau's "Anatomy" they are spoken of as the incisive openings or clefts.

In McFadyean's "Osteology," in the description of the premaxillary bone, they are described as the naso-palatine clefts; in the description of the foramina of the head they are spoken of as the naso-palatine or incisor clefts; and in all the illustrations they are called the incisor clefts.

In Huxley's "Anatomy of the Vertebrates" (p. 72) they are called the foramina incisiva.

* The occurrence of the two foramina is so rare that it is scarcely worth mentioning.

In Gray's "Anatomy" (p. 164), referring to man, it is described as the anterior palatine canal or fossa: "This canal, as it passes through the thickness of the palate, is divided into four compartments; two branch off to the right and left nasal fossæ, and two canals, one in front and one behind, lie in the middle line. The former pair are named the foramina of Stenson, and through them passes the anterior or terminal branch of the descending or posterior palatine arteries, which ascends from the mouth to the nasal fossæ. The remaining pair of canals is termed the foramina of Scarpa, and transmit the naso-palatine nerves."

Here, again, we find a confusion of terms to describe the same openings. To me it seems a pity that the term "Incisor cleft" was ever introduced into the vocabulary of comparative anatomy, for it implies that it is either close to or connected in some way with the incisor teeth, which is fallacious, for it is often, as in some rodents, far away from them.

If, as in some works on human anatomy, the pre-maxillary bones were given and retained the names of the incisor bones, the term would be admissible, but I am not aware that this is ever the case. Having been introduced, it has been retained, and carried on from book to book, and from teacher to student, for so long that there will probably be no disposition to drop it now.

I am going to suggest that these openings should be called the anterior naso-palatine apertures, to prevent their being confounded with any of the other foramina or openings having the distinctive appellation of *incisor*—or incisive—and in this article they will always be alluded to as the anterior naso-palatine apertures—*anterior* to distinguish them from other large naso-palatine apertures found in nearly all the marsupials and in some of the lower placental mammals—the erinacea (hedgehog) and talpa (mole) of our British insectivoræ—at the posterior part of the palate, and which, for distinction, might be named the posterior naso-palatine apertures; and apertures, because it is only in the horse they take the form of clefts: in most other mammals they are more or less distinct openings or apertures.

These anterior naso-palatine apertures always give passage to Jacobson's organ and Stenson's canal or duct (another confusion of terms, for it is applied to both the duct of the parotid gland and to this duct), and through them there is thus a com-

munication between the oral cavity and the nasal chambers, I believe, in all animals except man and possibly some anthropoid apes, and the horse and other equidæ, which I have not had the opportunity of examining in a fresh state.

But what is the significance of this? May we not infer from it that these organs, whose function is unknown, are necessarily connected with the sense of taste and smell? This appears to be the explanation, for in those animals where the sense of taste at this part of the mouth would be most essential, we find the anterior naso-palatine apertures the largest, and generally Jacobson's organ and Stenson's duct most fully developed; and we also find provision made for pressing food on its entry into the mouth directly in the orifices of these organs, for, with the one or two exceptions I have alluded to, there is always an oral orifice of these organs.

It is as well that we should have a clear understanding of what is Jacobson's organ and what is Stenson's duct or canal.

I should like to give here Huxley's description of these openings and the organs passing through them. In his "Anatomy of the Vertebrates" he says: "The foramina incisiva left between the premaxillaries and the palatine plates of the maxillaries in mammalia are sometimes closed by the mucous membranes of the nasal and oral cayities and sometimes not. In the latter case they are the *canals of Stenson*, and place these two cavities in communication. Glandular diverticula of the mucous membrane, supplied with nervous filaments from both the olfactory and the fifth pair, may open into these canals; they are called, after their discoverer, the organs of Jacobson."

"In snakes and lizards a second olfactory organ is found embedded between the turbinals and vomer, and is known as Jacobson's organ. It has the form of a cup or depression round a cartilaginous papilla, and is supplied by a nerve which arises from the end of the olfactory lobe."—J. Gray McKindrick, in *Encyclopædia Britannica.*

In Chauveau's "Anatomy" (p. 443) we have this description: "In front of this nasal region is remarked the canal or organ of Jacobson—a short duct, terminating in a *cul-de-sac* in the middle of the cartilaginous substance, which closes the incisive foramen. At the bottom of this *cul-de-sac* opens a second canal, longer, wider, and more remarkable, but which

has not yet been described." (It has been described by Stenson, and is named "Stenson's duct.") "It has sometimes the diameter of a writing quill, commences by a *cul-de-sac* on a level with the second molar tooth, accompanies the inferior border of the vomer from behind to before, where it is enveloped in a kind of cartilaginous sheath, a dependency of the nasal septum; it terminates, as we have said, after a course of about 5 in."

Gray's "Anatomy" (p. 832), referring to man: "In the inferior meatus the anterior palatine canal is either completely closed in, or a tubular *cul-de-sac* of mucous membrane is continued a short distance into it. This *cul-de-sac* is termed the organ of Jacobson, and is present in all mammals as well as man. In the former it consists of a bilateral tube, situated in the nasal septum and supported by hyaline cartilage, the cartilage of Jacobson."

I am going to suggest, for the sake of uniformity of expression again, in describing these parts, that when there is a direct passage through from the nasal fossa to the oral cavity, which is general, it shall have the distinctive name of Stenson's *canal*, so that it shall not be confounded with the Stenson's *duct* of the parotid gland, and the *cul-de-sac*, which is always present, shall be known as Jacobson's organ. This would certainly prevent some confusion, and I shall endeavour to adhere to these terms in this sense in these notes.

The sense of taste proper is conveyed to the brain in a large degree by the lingual branch of the fifth nerve, the filaments of which are distributed on the edges, upper surface, and tip of the tongue, the glosso-pharyngeal supplying the base of the organ. But the impression of many things taken into the mouth is produced by the sense of smell, rather than by taste, for if the nose is kept closed, or if it is occluded from any cause, say a violent cold, the sense of taste is almost lost. J. Gray McKindrick, in his article on "Taste" in the *Encyclopædia Britannica*, says: "Taste is, no doubt, closely allied to smell, giving rise to a sensation of flavour. Chloroform excites taste alone; garlic, assafœtida, and vanilla excite only smell. This is illustrated by the familiar experiment of blindfolding a person and touching the tongue successfully with slices of apple and an onion. In these cases the one cannot be distinguished from the other if *the nose is tightly closed.*" A proper appreciation

of the functions of Jacobson's organ, Stenson's canal, and the palate will explain this.

The posterior palatine branch of the fifth nerve supplies the palate, to which it is closely attached, and branches of the naso-palatine pass through the anterior-naso-palatine apertures and supply the dental pad, the gustatory pad (a term I will explain), and the parts immediately around and in Jacobson's organ and Stenson's canal, filaments supplying the flanges of the septum nasi, the erectile tissue found there, and to all the *cul-de-sac* of the organ.

If the lingual branch of the fifth supplies the sense of taste, the posterior-palatine and naso-palatine branches of the same nerve supply that sense so difficult to define, a blending of taste and smell, and it is with this special sense that the organ of Jacobson is concerned.

May I be allowed here to draw attention to a fact that is of some importance? Centrally situated on the anterior part of the buccal membrane, at a point that would be slightly in front of the anterior margins of the anterior naso-palatine apertures, and just where food, on being introduced into the mouth, would be first pressed against the palate, generally by the opposing lower incisors, is a distinct central pad of the buccal membrane, sometimes, as in ruminants, divided from the surrounding membrane by deep fissures; at other times, as in the horse, separated by depressions only. This is the spot that marks the oral openings of Stenson's canals when present, and when there are no direct openings of the canals, as in the horse, the pad is plentifully supplied with nerves from the naso-palatine, which pass on to it from Jacobson's organ. In man this pad is represented by a small but well-marked and always present papilla.

As this pad is always so placed as to receive the first impressions of food entering the mouth, and as, through Jacobson's organ and Stenson's canal, it is evidently associated with the sense of taste, I am going to suggest, for facility of description, that it has the distinctive name of the "Gustatory pad."*

This may be a possible explanation of the suppression of the upper incisors, and the substitution for them of the specialized

* In the VETERINARY JOURNAL for October, 1905, there is a very excellent article by Mr. N. G. Linton on the Morphology of the Mammalian Palatine Rugæ, in which this "pad" is described as the Papilla incisiva. I might say here that I had not seen this article until after my own notes were prepared for publication.

dental pad, in which is the gustatory pad, as an accessory of Stenson's canal and Jacobson's organ in so many of the ruminants.

In the normal mouths of all animals the biting edge of the lower incisors is behind the upper ones, when they are present, and they are thus made to press all food, as it enters the mouth, on to the dental and gustatory pads.

Another point of importance. Careful dissections show that not only the buccal membrane, but the septum nasi also, is so intimately concerned in the formation of these organs and canals that it is imperative to give a brief description of the anterior part of the septum in order to make a clear explanation of the origin of Jacobson's organ and Stenson's duct. I give a general explanation first, and then a more detailed description, with the notes of my dissections.

If the upper part of the nasal chambers is taken off—that is, the part bounded by the nasal bones—there will be found in all mammals, at the lower part of the anterior portion of the septum, a bulging, looking like a flange overlapping the vomer on either side. This is caused by a returning part of an appendix of the septum, which passes from the palate through the anterior-naso-palatine aperture, and forms the cartilaginous wall of Jacobson's organ. Between the canal and the pituitary membrane there are always venous trabeculæ, or erectile tissue (also present in other parts of the nose), which makes the flange bulge out over the floor of the nasal chamber until, generally, it almost meets the appendix of the maxillary turbinated bone, forming together a roof to the canal leading to the opening of Jacobson's organ. At this part both the flange and the turbinator bone are covered by erectile tissue, which, being brought into use, would make these parts meet, and form a veritable roof to the canal at the lower part of the nose, and impel the particles inducing taste or smell to the region of the distribution of the olfactory nerves.

In all mammals the anterior naso-palatine aperture is bounded on its anterior and two lateral margins by the premaxillary bone, anteriorly by the body, and laterally by the external and palatine processes respectively; its posterior border is always formed by the palatine process of the maxillary bone.

There are modifications in different animals as to the extent of the boundaries formed by the bones respectively—sometimes the maxillary bone extends along the posterior part of the outer

lateral margin, but the two bones named always bound the aperture in the manner thus stated.

The extreme orthognathism of man, as compared with other animals, with the lessening of the facial angle, has practically squeezed out the premaxillary bones and those apertures that are formed in, or by, them; and these gustatory organs and their accessories are little more than vestigial in him. In orthognathous individuals the anterior naso-palatine aperture is entirely obliterated; in prognathous individuals it is more pronounced; in the still more prognathous anthropoid apes it is larger—and it would be most interesting if one only had the opportunity to ascertain the measure of development of Stenson's canal and Jacobson's organ in these animals—while in the very prognathous baboons the apertures are quite large.

I have in my possession the skull of a prognathous European, and one of an orthognathous Hottentot. In the former the bony canal from the floor of the anterior part of each nostril to the mouth, giving passage in all other animals to Stenson's canal and Jacobson's organ, is clearly distinct. The canals from either side open separately on to the posterior part of the comparatively large common, single aperture on the palate a little distance from the central incisors.

In the skull of the Hottentot I cannot find any trace of even a small foramen in this situation in the floor of the nostril. There is a single central aperture on the palate, the anterior margin of which is close on to the alveolar borders of the central incisors.

That these organs are slightly functional in some men, at any rate, may be proved by touching the gustatory pad with various substances, as I have done, allowing a certain interval between each experiment, with the following results. I took every care to keep the tongue and lips well away from contact:—

Salt made no impression.

Plain vinegar made no impression.

Pepper made no impression.

Tarragon vinegar I could recognize by a faint sense of smell in the nose.

Infusion of Gentian.—I could recognize the flavour after a second or two, but not the bitter taste.

Tr. Chiratæ.—I detected a "spirit" flavour in the nose, but

I did not get the intensely bitter taste until I closed my mouth; the first experience of the "bitter" was about the root of the tongue and the soft palate.

Sp. Amm. Aromat.—Could be detected instantly by the nose.

Rum.—I could faintly recognize by the nose.

Martell's Brandy.—I could recognize.

Whisky.—A spirituous flavour, but I could not distinguish what it was.

Montagu Dop (Cape Brandy).—I thought I could recognize. I do not think I should have known what it was if I had not seen the bottle.

Pungent Sauces (Worcester, Yankee Tickle, and others).—The flavour can be detected but by the nose!

Mixed Mustard.—After a brief interval the flavour and taste is readily recognized by the nose.

Now, here is the point of these experiments. If I, man, in whom these organs are merely vestigial and suppressed, can detect flavour and taste in ever so small a degree by their agency, and taking care that neither tongue nor lip came in contact with the object, and that the nose was kept out of action except through the agency of the gustatory pad, how much more useful and important to the economy of the body must they be in such animals as the ruminants in which they are especially developed?

The ox, in grazing, is constantly "blowing," *i.e.*, breathing hard through the nostrils with a very distinct "grunt," over the grass on which it is feeding all the time during grazing, and even when the grass is ever so short, the tongue curves round each bite automatically. The nose is used exclusively in the selection of right herbage. Directly after every bite of grass the muffle and lip are drawn up forming a wrinkle across the lower part of the face, then the muffle is placed *on* the next bite, and so on. The muffle is first placed on a fresh piece of grass, when one part of the field is left for another.

To watch animals feeding it seems that all this part of the economy, the lower part of the nose, muffle, lip, and dental pad, is associated with the choice and the enjoyment of the flavour of food.

It is instructive to watch the ox trying to bite off twigs of bramble, how gingerly they are applied to the dental pad and

worked back in the mouth until the twig is bitten off by the molars, and then to see how the muffle is used amongst the bramble twigs to find any succulent shoots of grass growing there.

It is also instructive to watch closely a horse grazing. It will be noticed that the upper lip is used not only as a prehensile, but also as a selective organ. In choosing food the lip is first applied lightly; if there is any doubt as to suitability, the lip is pressed down on the grass.

After the grass has passed the lips there is just, *only very occasionally*, a small portion passed out of the mouth again at the angle of the lips, just a blade of grass or a piece of straw, or root of grass; but on examining these pieces they are always found to be offensive from some cause or other—fouled by dirt, or something of that sort.

At first sight it looks as though these oddments were dropped out accidentally, but this is not the case, they are always rejected for a reason. I have gathered these pieces together, as ejected, and, mixing them with sweet grass, tried the pony I was watching again, but they were refused this time by the nose test. In taking long cut grass the same selective method is carried out by the lip.

By the courtesy of Dr. Ridewood, Mr. Thomas, Mr. Pycraft, and others in charge of the Zoological Section of the South Kensington Museum, to whom my best thanks are due, I have been given facilities for comparing the skulls of various animals and noting the conformation and disposition of the naso-palatine apertures, and though I have had no opportunity of making dissections of the soft tissues of these animals, it will be safe to conclude that the apertures are functionally the same as in those animals I have dissected and described, viz., for the sense of taste through the agency of Stenson's canal and Jacobson's organ, which pass through them from the palate to the nostril.

(*To be continued.*)

THE IMMUNIZING OF IMPORTED CATTLE AGAINST THE BOVINE PLASMOSES OF SOUTHERN RHODESIA.

Indexed B. A. I.

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It is said that scarcely a generation ago there was no red-water in South Africa, and that it was imported into the sub-continent with Madagascan trek-oxen and cattle from the East Coast.

Once introduced it rapidly established itself, first along the great transport roads and around the outspans and centres of transport, and spread thence in all directions where climatic conditions were favourable. (Dr. Theiler, *Transvaal Agricultural Journal*, 1905.)

It is not known how or when red-water gained entrance into Rhodesia, but Dr. Theiler considers that it was probably brought into the country by salted cattle from the southern Colonies, and mentions the fact that he "made *post-mortems* of cattle belonging to a transport rider, who about fourteen years ago brought Matabele cattle to Pretoria, where they contracted red-water and died. This would seem to indicate that at that time red-water was not yet known in all parts of Matabeleland, otherwise, . . . these cattle would have been immune."

Be that as it may, the first occasion when red-water became of practical importance in Southern Rhodesia was in 1902, when East Coast fever was allowed to sweep through the country, being mistaken for "an aggravated form of bovine malaria." (*B.S.A. Co's. Gazette Extraordinary*, May 29, 1902.)

On this supposition it was considered desirable that the disease should be allowed to establish itself in Rhodesia in order that local stock might become immune, which it was hoped would be effected with but a small mortality. It was not till after East Coast fever had almost decimated the stock in the country that the mistake was recognized. Indeed, even at the present time there are some who deliberately and unfairly call East Coast fever by the name of Rhodesian red-water. Since hæmoglobinuria is not a lesion of East Coast fever, which disease did originate in Rhodesia, the name is manifestly incorrect and calculated to bring undeserved discredit upon this country.

The unfortunate mistake is explained by the fact that the microscopic examination of the blood of such animals occasionally revealed the well-known *Piroplasma bigeminum*, as well as *Theileria parvum*, a parasite of which little or nothing was known at that time.

Mr. William Robertson, M.R.C.V.S., to whom belongs the credit for first drawing attention to "strange forms, miniature rods strongly resembling small bacilli; other forms, ring or crescent shaped," &c., now known to be characteristic of *T. parvum*, mentions that he observed "the double pyriform stage of *P. bigeminum* in a small percentage of cases" (*Interim Report upon Cattle Disease in Southern Rhodesia*, May, 1902), from which it would appear that red-water was even then endemic in Rhodesia.

Since that time the systematic examination of the blood of sick animals and a closer study of the stock diseases of the country have greatly added to our knowledge of the bovine plasmoses of Rhodesia, while the invaluable researches of Dr. Theiler have afforded a basis upon which to conduct our more humble investigations.

As a result we know that the diseases of cattle, formerly grouped together under the terms red-water and gall-sickness, are due to one or more of several blood parasites, of which *P. bigeminum*, *T. mutans*, *Anaplasma marginale* and *A. centrale* are the most important.

The indigenous cattle of the country and those imported from the North appear to possess a relative immunity to these diseases, and have served as a valuable nucleus in the re-stocking of the country. But as these animals are small, slow in maturing, and useless for milking purposes, the endeavour has been made to improve them by the infusion of new blood. Unfortunately the importation of cattle has not hitherto proved successful, inasmuch as the great majority of such animals have promptly died, while those that have survived have received a serious "set back" in development and usefulness.

The progeny of such animals have also proved highly susceptible to the plasmoses; those which have not succumbed soon after birth have suffered from anæmia and cachexia, and become stunted and badly developed. In such animals ordinary calf ailments have readily established themselves.

The importation of cattle from the southern Colonies has not proved successful, probably because well-bred animals are not so numerous there that breeders can afford to part with them. Moreover, unless these animals come from red-water areas they suffer as severely as cattle from overseas and their progeny are no more resistant.

In the meantime the Veterinary Department has been investigating these diseases in the laboratory and in the field, with a view to establishing a successful method of prevention and treatment.

For a long time the various plasmoses of cattle were not distinguished as separate entities either by symptoms or microscopic examination of the blood, and were grouped together under such collective terms as "red-water," "tick fever," "gall-sickness," &c.

The term "red-water" was applied when the disease was characterized by the discharge of hæmoglobin-stained urine, whereas the name "gall-sickness" was made use of when the staining of the tissues with bile pigment was the prevailing feature.

When these diseases came to be studied more closely it was found that the indigenous cattle of this country, while themselves tolerant or immune, nevertheless harboured in their blood the infecting agents, which, when introduced in such blood into cattle imported from Great Britain or from certain districts of South Africa, gave rise to characteristic symptoms, which varied in different cases.

In one animal fever would be associated with hæmoglobinuria; in another, fever with jaundice would predominate. In other cases these symptoms were not conspicuous, but a severe anæmia resulted. It was further found in such artificially inoculated animals, that the reaction occurred in two stages: the first reaction commencing between seven and fourteen days after the injection; the second some thirty or forty days after, and, unfortunately, at a time when the subject was weakened by the effects of the first.

For a long time it was thought that the second reaction was merely an after-phase of the first and was due to the same parasite, namely, *P. bigeminum*; at the same time it was remarked that the parasite found in the blood-cells during the

second reaction materially differed in shape from the organism met with during the first period.

From its structure and from its position in the cell the name *A. marginale* has been given to it by Dr. Theiler, who, as the result of certain experiments, has declared that it is a species distinct from *P. bigeminum*, and gives rise to an infection which may occur quite independently of "red-water" (Piroplasmosis).

Recent observations in Rhodesia have shown that this anaplasmosis of cattle is a very widely distributed disease, especially among young stock, and particularly, as has been said before, among young animals of improved breeds. The more refined the breed the more severe the form of the disease. From the number of outbreaks it has been shown that shorthorns and shorthorn crosses are severely attacked; Friesland classes are also highly susceptible, but less so than shorthorns; Africanders appear not a little resistant, while a high percentage of native blood affords considerable resistance.

In practice it was found that the factors which intensified the virulence of the plasmoses were:—

(1) Passage through susceptible hosts.

(2) Prevalence of ticks.

(3) Faulty conditions of hygiene.

(4) Frequent interchange of cattle with infected centres.

On farms where the converse conditions prevailed the virus took on a milder type, a fact which was made use of when it was desired to obtain material for the inoculation of imported animals with a view to conferring immunity upon them.

Before the Veterinary Laboratory was established a very satisfactory and mild virus was obtained by the writer from calves of Northern humped cattle on a farm situated some twenty-five miles from Salisbury, where ticks were scarce, and where only Northern and indigenous cattle were grazed. These animals, for some unexplained reason, enjoy a remarkable freedom from ticks, and being poor milkers their calves are allowed to take the whole yield, and are not stinted for the sake of the separator as frequently happens in the case of the young of better milking classes; and, further, it is well known that the virus is less severe when obtained from young than from older animals.

Later, when a closer study and control could be carried out

at the laboratory, such a virus was standardized by frequent passages through suitable animals which were kept free from ticks. This strain contained *P. bigeminum*, *A. centrale*, and *A. marginale*.

The discovery by Nuttall and Hadwen of the specific effect of trypan-blue rendered the use of this virus all the more safe, as with this valuable drug the reaction of *P. bigeminum* could be controlled. This reaction was allowed to run its course within the limits of safety, and the drug was applied at that stage when the greatest amount of immunity would be derived. In this way the usual ill-effects of piroplasmosis were avoided, and by careful nursing and treatment the animals were brought into the most favourable state of health to resist the mild anaplasmosis, which followed within ten to twenty days.

Although this system proved satisfactory, greater relief was felt when Theiler placed the matter upon a more scientific and certain foundation by his discovery that the second reaction, or anaplasmosis, was the result of the action of two parasites: (1) *A. marginale*, which gave rise to a severe and harmful effect; and (2) *A. centrale*, which, although it gave rise to a comparatively harmless reaction, conferred immunity against infection by *A. marginale*.

Theiler succeeded in separating these two elements and, by inoculating animals bred in Great Britain and never exposed to natural infection in South Africa, established a pure culture, as it were, of the mild and immunizing strain.

By the courtesy of the Union Government such a standard animal was obtained, and was sent to the Veterinary Laboratory at Salisbury, where it has been kept carefully protected from ticks.

During the past the risk and responsibility of importing animals for the improvement of the local stock has been borne by individuals, rather than by the large land-owning companies, who have been content to look on and to quote the more successful results for purposes of advertisement. This system being manifestly unfair and wasteful—for such experiments to be of value should be carried out on a broad basis—the British South Africa Company recently undertook to import for *bonâ-fide* farmers a number of thoroughbred bulls from Great Britain, and to immunize them at their risk before distribution.

On the advice of the Veterinary Department, it was laid down for the guidance of those responsible for the purchase of these animals that they should be between the age of nine and fifteen months, this being proved to be the most favourable age for travelling and immunizing. It was suggested that the bulls should be hardy, pasture-fed animals, whose type had not been produced at the expense of constitutional vigour, and that any evidence of undue forcing or pampering should be a disqualification. These recommendations were not strictly adhered to.

These animals were shipped per ss. *Langton Hall* (Bucknall Steamship Co.) on June 16, and arrived safely in Salisbury on July 17.

The consignment consisted of 15 Shorthorn bulls, 15 Hereford bulls, 15 Sussex bulls, bought to the order of the B.S.A. Co.; and with them 5 Hereford bulls, 2 Hereford heifers, 7 Sussex bulls, 1 Red-polled bull, 1 Lincoln Red, bought privately; 1 Shorthorn bull (bought privately) arrived later.

Most of the above were animals from one year and nine months to two years old, very well developed, but fat and evidently force-fed.

In addition to these there were at the station under inoculation at the time of their arrival 4 Aberdeen-Angus bulls, 1 Roan Shorthorn bull, bought and imported by private enterprise.

Although the bulls had arrived without mishap, they were nevertheless very soft and footsore after their journey. As nothing is so detrimental to the chances of an animal undergoing this inoculation as an excessive deposition of adipose tissue, it was decided to postpone the operation for a week, during which time every endeavour was made to get the animals into a " firmer " condition by exercise and careful dieting.

Now it must be pointed out that the greatest difficulty in connection with the process of conferring an attack of plasmosis of standard strength is to keep the animals free from ticks throughout the period of reaction of the known virus, for should a single infective tick attach itself, the artificial reaction becomes complicated by a natural infection of unknown strength.

It is only those who have had to deal with ticks in a tick-infested country who can appreciate what it means to keep sixty-seven bulls tick-free for a period of three months. Happily, the months of July, August and September are at the

end of the dry season, when the ticks are less plentiful than at any other time of the year.

Nevertheless the reality of the danger was shown in the case of the two Hereford heifers which, on being detrained, became excited and unmanageable, breaking away on the veldt, where they remained four days. They were brought in covered with ticks, and thereby contracted a natural infection from which one died, and the other was saved only with the greatest difficulty.

It became necessary, therefore, to clear a road from the railway to the inoculation station, and to render the huts and camp tick-free. Veldt hay, that had been stacked for two years, was used for bedding, and food-stuffs likely to contain ticks had to be excluded from the dietary.

Certain food materials had been brought from England, but these had to be economized and gradually supplemented by local foods, in order that when distributed the animals would take readily to Rhodesian diets.

Eventually the ration supplied to each animal *per diem* consisted approximately of 6 lb. green forage, 7 to 10 lb. Kaffir pumpkins or melons, 2 lb. linseed cake, and manna hay (a local millet) *ad. lib.* The total ration amounted to nearly 40 lb. per head *per diem*. But it must be pointed out that the feeding of the animals was by no means a mechanical process, but that each animal had to receive individual attention and a diet based upon its requirements.

It is satisfactory to record that from the time the bulls left England until the time of delivery to purchasers, over four months, only one animal suffered from any digestive trouble (and that as a sequel to choking), and that the sum paid for drugs for the treatment of the animals, which, it must be remembered, had been inoculated with two severe diseases, did not amount to £10. No drastic purgatives were ever employed, but the bowels were kept in a satisfactory condition by a judicious regulation of the linseed supplied, either in the form of cake, ground seed, or linseed gruel.

The bulls were stabled in thirty round huts, made of raw brick and thickly thatched. Each hut was capable of housing two bulls. These huts were found far superior to the two brick stables roofed with galvanized iron, being cooler in the day

and warmer at night. The even temperatures of the animals stabled in them was in marked contrast to the unsteady records of those animals stabled in the latter, a matter of great importance, as imported animals find the variations between the extreme heat of the day and cold at night very trying.

At the Inoculation Camp it was found that a walk in the sun would often cause an elevation of temperature of 2° F. If when the animals are distributed they are allowed to travel long distances with the cows, it is feared they will suffer severely, especially as they will be getting their winter coats in the middle of the Rhodesian summer.

The temperature of each bull was taken night and morning during the four months, and very valuable records have thus been collected. It is interesting to observe a certain similarity in the character of the charts according to the different breeds. Thus, when the records are set out on a long scroll one beneath the other in groups according to breeds, it is possible at a distance to distinguish the groups from the general appearance presented.

The three charts on pp. 148-9 are chosen as characteristic of (1) the Shorthorn, (2) the Hereford, and (3) the Sussex, although, of course, variations occurred even among the individuals of a breed.

In the third may be noticed a well-defined but constant difference between the morning and evening temperature, and experience has shown that this "resilience" is indicative of constitutional vigour, for those animals in which it has been well marked have withstood the inoculation best. This observation applies not only to the chart as a whole, but especially to that portion of the record taken when the animal is suffering from either of the reactions. In those cases where the temperature has risen continually, the morning record being as high or higher than that of the night before, the animals suffered more than those whose temperatures may have been as high or even higher, but have shown a well marked "resiliency."

A few typical reactions are here shown. Chart No. 4 is of the former kind, an example of what may be termed a "flat" reaction. It is from the charts of the two animals which died. No. 5 is from the chart of an animal which, while it reacted severely, never caused any anxiety.

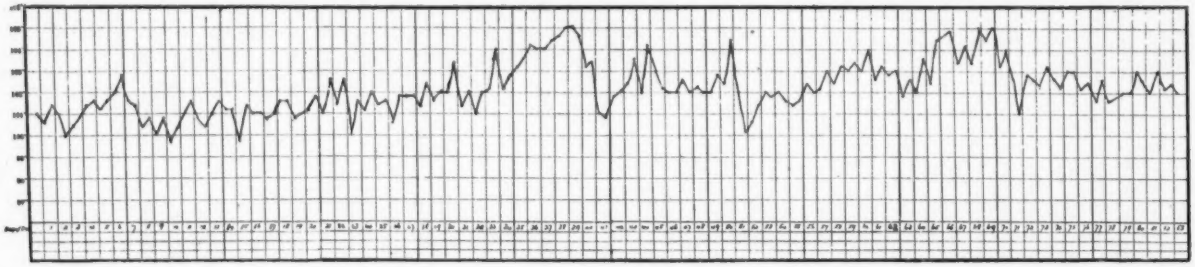


CHART 1.—Shorthorn "Favourite Pride." Age 1 year 9 months.
Bovine plasmosis.—(Temperatures July 24 to October 15.)

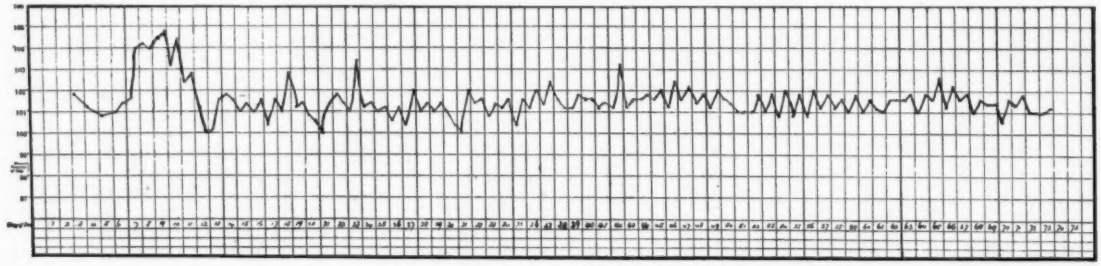


CHART 2.—Hereford "Peerless." Age 1 year 9 months.
Bovine plasmosis.—(Temperatures July 31 to October 9.)

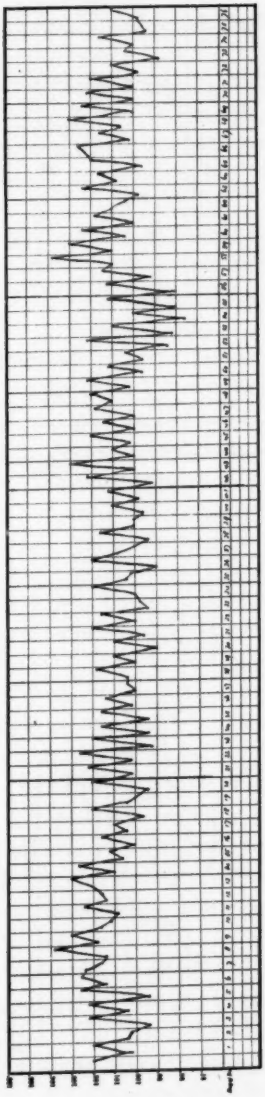


CHART 3.—Sussex "St. Valentine." Age 1 year 9 months.
Bovine plasmosis.—(Temperatures July 24 to October 8.)

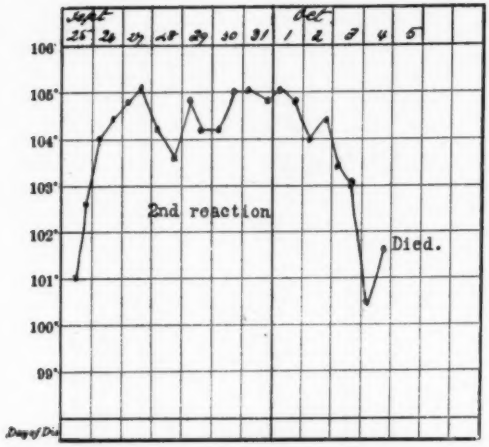


CHART 4.—Shorthorn "Sweetmeat."
Anaplasmosis.

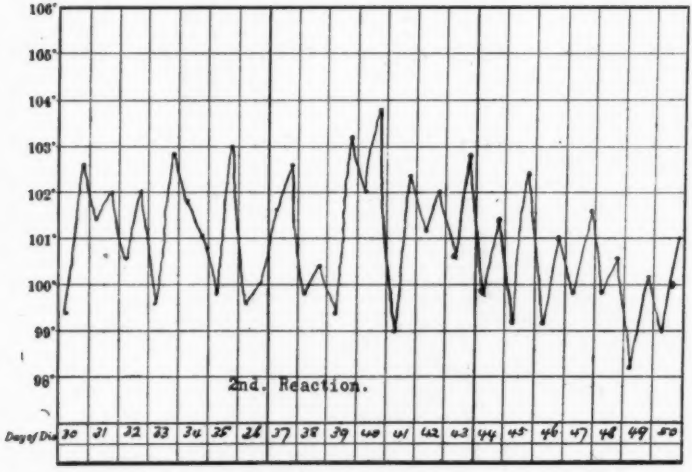


CHART 5.—Sussex "Linton Prince."
Anaplasmosis.

It is an interesting fact that temperatures of the first type were chiefly met with in animals which were generally admired for their "points," probably impressed upon them by close breeding, but at a loss of constitutional vigour.

Even among the Sussex, a breed which has been less tampered with for show purposes, certain animals which showed evidence of human interference, or, as it would be called, "improvement," could be detected by the "flatness" of their temperature records.

In quite an appreciable number of cases the reaction terminated by a sudden drop to a subnormal temperature, as in charts 6 and 7, and from this point clinical symptoms ceased.

In several charts, of which one specimen is given (7), a temperature of malarial type is presented. But in looking through these charts it will be found difficult to determine the exact time occupied in the completion of a cycle; this is perhaps accounted for by the fact that the temperatures were taken at irregular intervals, the morning record being taken between 7.30 and 8.30 a.m., and the evening record between 4.30 and 5.30 p.m., so that nine hours elapsed between the morning and evening taking, and fifteen hours between the evening and morning. Thus it is possible that the completion of the cycle may have sometimes occurred undetected.

With costly animals at stake, any experiment involving risk had to be avoided, and consequently an attempt could not be made to solve many of the problems which presented themselves.

The question as to the influence of the dose of a virus is one of these, some authorities maintaining that it is immaterial, others attaching considerable importance to the quantity of blood used. The bulls were inoculated with doses varying from 5 c.c. to 10 c.c., and from the charts it would appear that within these limits, at any rate, the dose does not influence the reaction.

In reviewing the results by Dr. Theiler's virus, the reactions are found to vary with the different breeds, so that it is best to consider each separately.

In the Shorthorns the first reaction appears as a marked and regular curve extending from the fifth to the fifteenth day; but it is impossible from the temperature to define any well-marked period during which the second reaction was most active, as irregularities were liable to occur at any time between

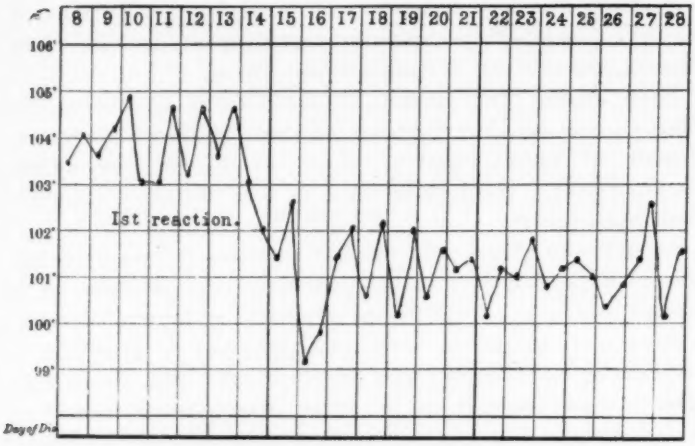


CHART 6.— Hereford "Shraward Abbott."
Bovine plasmosis.

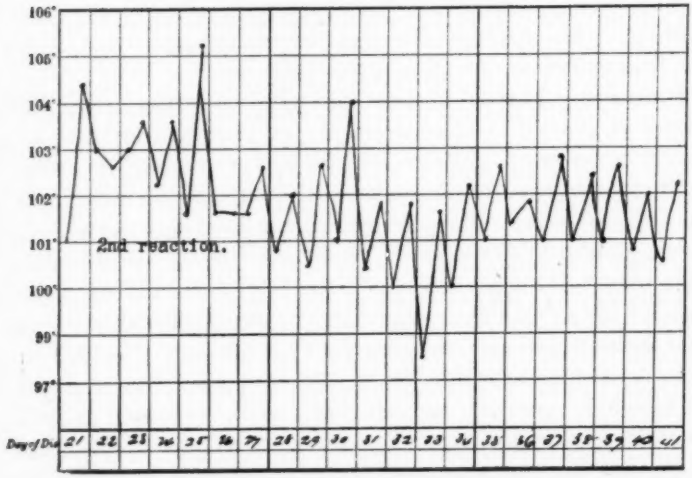


CHART 7.— "Pyon Monitor."
Bovine plasmosis.

the twenty-fifth and fortieth days, and recurrences sometimes occurred between the fifty-fifth and seventy-fifth days.

The reactions in the Sussex animals were marked by irregularities of temperature rather than by any continued elevation or well-defined curves. These irregularities generally occurred between the fifth and fifteenth days for the first reaction, and the twenty-fifth and sixtieth days for the second. It was in this breed that the malarial or intermittent type of temperature was most noticeable. None of these animals were ever acutely sick.

The Hereford bulls reacted in a more regular and orthodox manner. The period in which the first reaction occurred was between the sixth and seventeenth days, and the second between the thirtieth and fiftieth days.

The process of immunizing the sixty-seven head was accomplished with the loss of but four animals.

(1) Hereford heifer, which contracted natural veld infection.

(2) One shorthorn bull, inoculated with Pretoria virus, died with the first rise of temperature, probably from heart failure.

(3) Two shorthorn bulls, inoculated with local virus, died of anaplasmosis, biliary form.

In releasing the bulls as "salted" and exposing them to veldt tick infection, we are relying implicitly upon our faith in Dr. Theiler's dicta, for in most animals the reactions have been so mild that it is difficult to realize that active immunity against such fatal diseases as red-water and gall-sickness, as we know them in this country, is caused thereby.

There is a certain amount of risk also that the virus of the Transvaal may not "hold good" against the Rhodesian strains.

Dr. Theiler writes in the *Transvaal Agricultural Journal*, 1905, p. 489: "It was seen that cattle immune against red-water in one part of the country might contract the disease when brought to another. It is common experience that cattle born and bred in the low veldt show strongest immunity. We can explain this by taking into consideration the fact that the ticks are most frequent in the warm low-lying regions. There seems also to exist a stronger virulency of the micro-organism in some parts of the country." From this it appears that the immunity is in relation to the severity of the infection.

In a private letter to the writer Dr. Theiler says: "We have

different sorts of red-water, and one does not mean immunization against another."' There would, therefore, appear to be reasonable grounds for fear that the very mild reactions caused by the Pretoria virus may not have conveyed sufficient immunity to withstand natural infection in Rhodesia with what may prove to be a "different sort of red-water."

The virus elaborated by the writer was a collection of Rhodesian strains attenuated by passage, and was known to produce a severe reaction, but within the limits of safety. It has now been applied to forty-six imported animals: twenty-six from non-red-water areas of the Cape Colony, and twenty from Great Britain. There have been two deaths only in the latter, but the reactions have been strong, the first between the ninth and sixteenth days often having to be "shut off" by the application of trypan-blue, the second characterized by a persistent high temperature between the twentieth and fortieth days.

It is true that high fever and anæmia constitute a severe strain upon the animal, but careful nursing and treatment are quickly responded to, and there is the satisfaction of knowing that the animal has passed through an attack of the local plasmoses and, if the immunity is in proportion to the severity of the infection, has derived a strong protection.

It will be interesting to observe the results of the two processes in the field. If the method of Theiler proves as satisfactory as that of the writer, and it is hoped it will, it is much to be preferred by reason of its simplicity and safety.

Trypan-blue.—It was the intention of the writer to append some notes on the action and uses of this drug, but a recent article by Dr. Theiler on "The Treatment of Red-water in Cattle with Trypan-blue"* renders this unnecessary.

A few remarks, however, may be advanced. Trypan-blue has undoubtedly a specific action against *P. bigeminum*, but should be applied at such a time that the destruction of a sufficient number of parasites in the blood and the liberation of a large quantity of toxins may be followed by the maximum degree of immunity obtainable consistent with safety.

The proper time for the application of the drug is not to be gauged so much by the temperature chart or clinical symptoms as by regular microscopic observation of the blood.

* See VETERINARY JOURNAL, February, 1912.

This drug has been boomed in the public press and has made its way into the hands of laymen, and is thereby likely to be abused. It may be pointed out that an agent having such a profound effect upon the cells must exert some influence upon the animal economy, and especially upon the blood-forming organs. It may be mentioned that during the past year several dogs treated by laymen with Trypan-blue for suspected "malignant jaundice" have recovered from the acute attack, but have subsequently developed a form of pernicious anæmia which has proved fatal.

Whether this is the result of the treatment or in spite of it cannot be definitely stated, but there is sufficient evidence now available to indicate that the empirical use of this valuable agent should not be encouraged.

The misuse of drugs, of the greatest value when properly applied, may, "like a gun in the hands of a monkey," be attended with disastrous results.

RECENT INVESTIGATIONS ON THE ETIOLOGY OF FOOT-AND-MOUTH DISEASE.*

By Dr. J. SIEGEL.

Berlin.

Indexed B. A. I.

(*Continued from p.* 82.)

Histological examination showed much cell infiltration and always increasing infiltration of cell nuclear tissue between the muscle fibrillæ. At one place there was rather well-preserved muscular tissue with many scattered nuclei; these occurring close together, one noticed a gradual increase of collected nuclei between the fibrillæ, and in like measure a duller delineation of muscle fibrillæ which showed plain cross striation at its edges, but complete homogeneous clumping as regards the nuclei. The cells consisted of spindle, round and epithelioid cells, and partly through growth of vascular cells and through wandering out from the blood-vessels the muscle nuclei had congregated together. The cellular mass reminded one very much of syphilitic products. The proof of singly situated cocci in such a nuclear rich tissue was beset with great difficulties.

* Communication made on November 25, 1911, to an assembly of Prussian Government Veterinary Surgeons. From the *Berliner Tierärzt. Woch.*

If the cocci had been present in such clusters as is generally the case in the pyogenic variety, the proof of them in sections would probably have presented little trouble; but in their characteristic isolated form, as recognized by me from sections of young vesicles, they were hard to portray on account of the necessary fineness of the sections, and also by reason of the use of special staining methods, which was necessary in order to display the minute forms plainly and distinctly. It was found out that sections over 2 microns were not useful for examination. Their recovery in such firmly infiltrated tissue is beset with difficulties. Staining was accomplished by means of hæmatoxylin and methylene-blue. Sections remained for quarter of an hour in Delafield's hæmatoxylin, then after rinsing in distilled water they were placed in 1 per cent. hydrochloric acid for quarter of an hour. Then they are put for half an hour in running water and shortly afterwards stained with methylene-blue; then, rinsing with water and alcohol, the latter gradually made absolute, care being taken that the methylene-blue staining is not completely drawn out. A heart section prepared thus shows a similar picture as in a section of a young vesicle. For staining a vesicle section the same method may also be employed. One also sees in the blood, in the contents of the vesicle and in the heart material, the same cocci if one obtains a timely supply of material and employs the right methods.

The cultivation of the cocci in solid media with the addition of albumin was not successful.

By a mixture of equal parts of fresh blood and bouillon and a transmission of a part of this emulsion (a few drops) on to agar one sees the growth of the cocci on the agar in the form of minute bluish iridescent points, which mostly grow in an isolated fashion until they finally coalesce, especially on a damp surface. Before one transfers these first culture points to fresh tubes one should let them develop well, say, for about two weeks.

The morphology of the grown bacteria may be classified as that of the cocci and diplococci. Single forms change in size and shape according to the age and the kind of media. In bouillon and very young agar cultures the diplococci predominate. The size of the most minute forms is from 0.1 to 0.2 microns.

Since the virus of foot-and-mouth disease is known to be filtrable I soon undertook investigations in this connection. The thickness of the filter was established by mixture of a watery emulsion of agar culture with *Spirillum paranoia*, an easily visible and high-growing variety of spirillum. I recollected an observation I had made a year previously, namely, that a *Penicillium glaucum* culture grown in distilled water reached a tenth of its natural size, and I turned this hunger principle to account with the cocci under investigation. The result was as desired. After a three days' growth in a solution which consisted of 1 part of bouillon and 99 parts of distilled water, a growth of remarkably small forms occurred, not larger than the average in the vesicles, and now filtration succeeded, so that I could stain the cocci in the filtrate on the slide as well as cultivate them in the recognized way.

Staining of the cocci is not hard, as they easily take all aniline dyes. According to Gram the little diplococci are not stained, but only the large mucus-infected conglomerates of the older agar cultures are stained by this method.

Gelatine is not liquefied, and in plates the culture punctæ grow as quite sharply-defined flat circles, at first clear transparent yellow and later on a darker colour. Older agar cultures glisten as a rule. The colour of agar cultures is at first yellowish, but in further generations gradually change to pure white. The yellow colour returns again after transmission to the rabbit or pig. The cultures grow the darkest on blood-serum-agar, whilst spleen, gland and kidney agar produce white cultures. Staining also is not constant within certain limits. Up to now I have bred twenty strains from blood and spleen which are all identical. On modifications of virulence I have not yet made sufficient experiments.

The results of inoculation of pure cultures, as also of cattle spleen, in which the cocci occurred pure was as follows: Three rabbits which were inoculated on the cornea with spleen substance in the same way as in Guarnier's experiment with vaccine lymph, showed after twenty-four hours a more or less deep clouding of the cornea with thickening of the epithelium in one case. In sections of the cornea the cocci were plainly demonstrable. The same appearances, only in very much more pronounced form, occurred in four rabbits directly inoculated

with pure culture. Here the cloudiness in three cases degenerated into necrosis and the formation of vesicles. The cocci could be found here again in sections. Twelve rabbits were peritoneally inoculated, four with spleen substance. Cocci were found in the ascitic fluid which subsequently developed.

Seven pigs were inoculated with pure culture of the sixtieth to seventieth generation. Five were fed *per os* with culture, and two of these five intravenously inoculated a few days later. All five animals fell ill seven days after feeding, showing inflammation, swelling, redness of the snout, of the upper and lower lip of the gums, and vesicles and erosions on the inflamed places. A sixth pig put with the five ailing ones fell ill with the same symptoms after three days. Intraperitoneal inoculation with pure culture and spleen emulsion caused peritonitis and ascites, and the cocci were found in the fluid.

Two calves and ten heifers inoculated subcutaneously and fed with culture showed typical foot-and-mouth fever and development of an exanthema on the mucous membrane of the mouth and lips, slight in a few cases, but in others exhibiting vesicles and erosions.

Inoculation certainly produces foot-and-mouth disease in a mitigated form. The virulence of cultures depends on taking material, such as lymph, from the vesicles, as near as possible to the time of their first appearance. Lymph from old vesicles is frequently so weak that even the inoculation of several cubic centimetres will scarcely produce a single vesicle. The same weakening principle operates in the case of lymph which is transmitted in experimental cases from one animal to another. Its effect does not last long, and lymph originally most virulent only produces barely visible vesicles even if used in large quantities, but these must still be taken as signs of foot-and-mouth disease.

The ten heifers were later on housed with a severely affected cow in order to test their immunity. All the animals were only slightly affected. Two, in which the inoculation was undertaken in a special way, were only so slightly affected that no febrile rise could be detected although the temperatures were taken twice daily, whilst vesicular formation in the mouth was very slight and was absent from the feet. These immunization experiments will be continued. The aim must be to find out

the best proved methods to confer such strong immunity that the course of the disease may run without fever and disturbance of the general health, and with minimal or no exanthematic symptoms. A detailed work with several photograms will appear in another place in a short time.

The following were demonstrated by the doctor at the meeting:—Three blood-smears with parasites, a smear from vesicular lymph, from ascitic fluid, a section of a quite young vesicle. section of the heart, together with parasites, as well as a preparation of pure culture. Also preparations photographed, magnified 1,000 times,* one heart section 300, and another 1,000 times magnified. Professor Scheffer, of Berlin, prepared and took the photographs.—*Berliner Tierärzt. Woch.*

Equine Clinicals.

AN EXCEPTIONAL CASE OF EQUINE TUBERCULOSIS.

By S. B. VINE, M.R.C.V.S.
London, E.

Subject.—Bay mare, light vanner, age 7 years.

Symptoms.—This mare was admitted to our infirmary on June 24, 1911, with congestion of the lungs, and treated in the usual way with stimulants and tonics. Two days later several buds appeared on the course of the lymphatic vessels of the abdomen and chest, with one or two on the inside of the hind legs. The temperature being then 103° F., she was not tested with mallein until the night of the 28th, when to my great surprise she gave no reaction whatever. From then onwards more buds appeared on the body daily as small hard swellings, which in a few days ripened and discharged pus. This pus was simply that of an ordinary abscess, and the case was treated as pyæmia. In about a week the body was simply covered with abscesses in different stages of formation, giving to the animal a very repulsive appearance. In the meantime the mare bruised

* A photograph reproduced by the *Berliner Tierarzt. Woch.* was a blood-smear containing diplococci and other cocci taken in the febrile stage before the eruption of vesicles. Each coccus, as seen in the photograph, is stated to consist of a group of still smaller structures.

her near hip, which resulted in another large abscess and slough. The exact number of cutaneous abscesses was not counted, but was considerably over a hundred, as on the morning of July 8 I lanced thirty "ripe" ones on one side of the body alone.

After giving no reaction to the mallein test, it was decided to treat the abscesses. These were washed and antiseptic lotions applied daily, whilst internally tonics, stimulants, and antiseptics were administered. Under this treatment the general health of the patient varied greatly. For a few days she would improve nicely, eat moderately well, and be fairly strong when moved round the box, and have a normal temperature; then for the next two or three days she would just be the reverse, with a temperature of 102.4° F. On July 18 it was decided that further treatment was useless, and so she was destroyed.

Post mortem.—The spleen contained three caseous masses, one being twice the size of a human fist, and the other two half that size. The liver was also diseased, but the mesenteric and other abdominal lymphatic glands were free. Miliary tubercles were present in the lungs, but the bronchial lymphatic glands had again escaped. The most interesting organ, however, was the heart, the auricles of which were *ossified*, resisting all attempts at cutting with the knife.

Sir J. McFadyean kindly examined those organs for me, and declared the case to be one of tuberculosis.

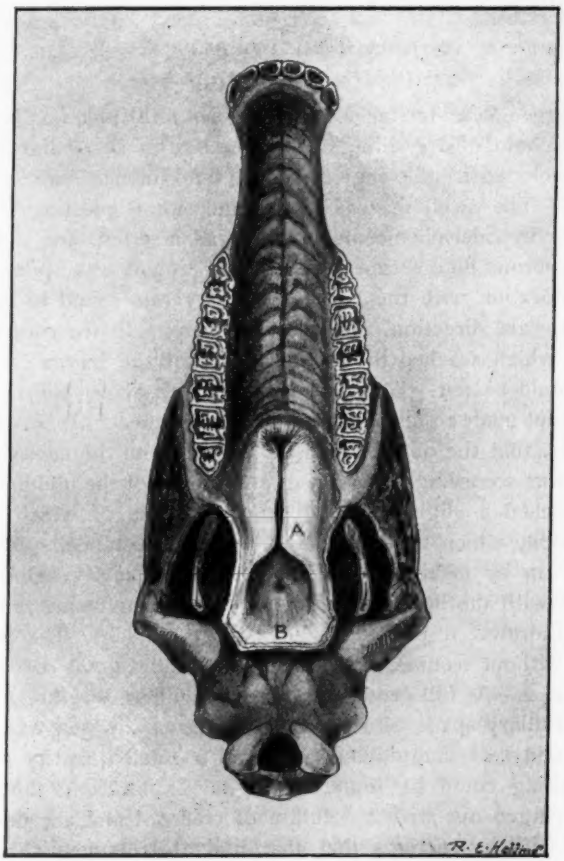
Remarks.—Although the heart was found in such an advanced state of disease on *post mortem*, the pulse during life gave no indication whatever of its existence. The number of beats per minute was accelerated and the force was weaker, but its action was never irregular nor intermittent.

AN INTERESTING CLEFT PALATE IN AN AGED HORSE.

By J. J. RIDLEY, M.R.C.V.S.
Beverley.
AND
FREDERICK HOBDAY, F.R.C.V.S.
Kensington, W.

In a recent number of The Veterinary Journal we reported an instance of cleft palate occurring in a thoroughbred foal, and, curiously enough, the subject of the enclosed sketch was in the

same neighbourhood at the time. The subject was a mare, and the interesting part about her was that she had lived with the palate in the condition depicted here until the age of twenty-two years. She had always had an objectionable nasal discharge



Sketch of head showing (A) the cleft in the palate.

during and after feeding, the colour and character of which depended upon the food she was taking at the time. She was in good condition and in regular work until within a few weeks of her death. She was destroyed owing to severe lameness caused by foot trouble.

Canine Clinicals.

SOME SWELLINGS IN THE REGION OF THE DOG'S THROAT, CAUSED BY THE PRESENCE OF FOREIGN BODIES.

By J. BASIL BUXTON, M.R.C.V.S.
Royal (Dick) Veterinary College, Edinburgh.

Case 1.—A fox-terrier dog, about 18 months old, was brought in on account of a swelling, about the size of an orange, which had developed in the region of the left submaxillary salivary gland. The swelling was tense, and not "pointing." An ordinary hypodermic needle (large) was inserted, and a blood-stained serous fluid escaped. The enlargement was opened, and on exploration with the finger the cavity was found to extend, in an upward direction, towards the larynx. In the roof of the cavity, which reached the upper border of the larynx, a sharp point could be felt. This was grasped with artery forceps, and an attempt made to dislodge it, but without effect. It was found, however, that the object could be pushed from the cavity. The throat was accordingly examined, and the tip of the middle finger just reached a slight swelling, in the middle of which was a depression, which accommodated a hard substance. This was pushed up by means of the forceps in the cavity below, and grasped with another pair of forceps, those below being removed. On withdrawal it proved to be a large tintack. The wounds closed without trouble, and the animal made a good recovery.

Case 2.—A full-grown collie dog with a swelling in the intermaxillary space, situated over the larynx, which was found to contain sero-sanguineous fluid and a small quantity of pus. As nothing could be found on digital exploration, the cavity was syringed out with a solution of chinosol and the dog sent home, with instructions that that line of treatment should be continued. At the end of a week the dog was brought back, there being no improvement. The cavity was again examined, and a hard, wire-like substance could be felt in its roof, which extended round the left side of the larynx. As it was impossible to move it either backwards or forwards, traction was applied, and it snapped. The two portions, on being removed, proved to be a darning needle containing thread.

Case 3.—A black pug puppy was brought to the clinic with "a bone in its throat." On examination a hard substance could be felt up the left side of the neck, and a point seemed to be nearly through the skin immediately below the angle of the jaw. The presence of a hatpin was suspected, similar cases having been seen. Accordingly the skin was incised, and the point brought through and grasped with artery forceps. The puppy was then placed on its back and the head well extended, the pin was drawn through the opening as far as the head would allow, and then turned back and the head pushed up the throat, a finger in the mouth guiding it past the soft palate. The skin wound was painted with collodion, and required no further attention. The pin proved to be a lady's ordinary black-headed hatpin, 10 in. in length. The puppy measured 12 in. from the angle of the jaw to root of tail.

HYSTERECTOMY IN AN AGED BITCH.

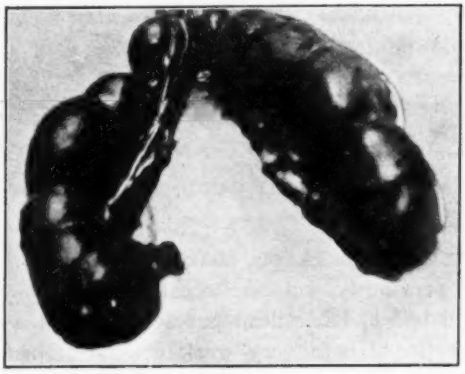
By J. STEWART WOOD, M.R.C.V.S.
Parkstone, Dorset.

A NINE-YEAR-OLD black pug bitch, "Sue-Sue," which had, some years previously, on one occasion been the subject of dystokia, and had had her dead puppies removed with forceps, was brought to me in a very weak condition, being partially paralysed, much distended at both flanks, and with a blood-stained discharge from the vagina.

A diagnosis of purulent metritis was made, and I advised immediate removal of the womb. Three-quarters of a grain of morphia was injected hypodermically, and half an hour later chloroform was administered. The reason for which I gave the morphia was that on a previous occasion when I had used chloroform she took it badly, yelping and struggling even when apparently well under its influence. The combination acted well.

On opening the abdomen along the *linea alba*, the bladder (which was full of urine) protruded, and I emptied it with a hollow needle. I did this in order to save time, and in preference to soiling my hands by passing the catheter. Returning the bladder, I easily found the two horns of the uterus, as they were very much distended, so much so that it was not easy to with-

draw them through the abdominal wound in order to ligature the most prominent vessels. I ligatured the body of the uterus, running the catgut first through and then round, and cut behind the ligature. Originally I had intended to make a wedge-shaped incision and suture the edges, and as I thought it would have been easier, and perhaps safer, I changed my mind at the last moment, chiefly to save time. Both horns of the uterus, united by a stump of the body, were now removed, together with the ovaries, and the peritoneal wound was stitched with a continuous gut suture. The abdominal wound, with the same kind of gut, was now sutured in a similar manner, and the skin wound was closed with interrupted silk sutures.



Uterus of bitch enormously distended with purulent contents.

Owing to the weakly state of the little patient I had not great hopes of a recovery, and I therefore worked as rapidly as I could; there was very little hæmorrhage.

After the operation "Sue-Sue" was placed in "Roger's veterinary brooder," an apparatus for maintaining the body heat. Her temperature for some days varied from 96° to 99° F., and she took liquid nourishment on the second day. The wound healed very rapidly, and the sutures were removed in six days, whilst in ten days the wound was hardly discernible. I attribute the rapid union to the warmth, as a noticeable feature was when, as happened on two occasions, the "brooder" was allowed to get cool, the bitch's temperature dropped one degree.

The photograph shows to some extent the extraordinary distension of that organ. Since the operation the animal appears to have, to a great extent, regained her youth. The contents of the womb consisted of greyish-coloured blood-tinged pus.

AN INTERESTING INGUINAL HERNIA.

By W. JAMIESON, M.R.C.V.S.
Derby.
AND
FREDERICK HOBDAY, F.R.C.V.S.
Kensington, W.

The patient, a Yorkshire terrier bitch, aged 6 years, and weighing about 3 lb., had been in the possession of its present owner since a puppy and had never been allowed to breed. When purchased there was no sign of any abnormality, but about two years ago a swelling about the size of a walnut was noticed in the left groin. This had gradually increased in size, especially at each period of œstrum, and was now as large as a goose egg, almost touching the ground during progression.

The hernia was quite irreducible without an anæsthetic, and even when chloroform was administered it was only after the skin had been incised and the sac exposed and dissected to its base that the contents could be returned to the abdomen. During this process, although the manipulation was made in as gentle a manner as possible, a small hole was made in the sac near the inguinal ring at a point where the wall (owing to the weight of the contents) had become very thin and the contents were exposed.

The latter consisted of uterus, small intestine, and a portion of omentum, and it was only with extreme care and after some ten minutes' patient manipulation under deep anæsthesia that these were induced to return and stay in the abdomen. A ten-day catgut ligature was then applied to the base of the sac and several sutures of the same material were applied around it in order to strengthen its position and close the canal. The skin was sutured with silkworm gut and a bandage applied, the wound afterwards being treated antiseptically. The operation was done on January 27, and the patient has made an uninterrupted recovery.

Abstracts.

A SIMPLE METHOD OF PURIFYING ALMOST ANY INFECTED WATER FOR DRINKING PURPOSES.

By G. G. NASMITH, M.A., Ph.D.,
*Chemist of the Board of Health of Ontario, Canada,**
AND
R. R. GRAHAM, M.B.,
Assistant Chemist.

Since 1897, when Dr. Woodhead sterilized the water supply system of Maidstone, England, by a solution of hypochlorite of calcium during a typhoid outbreak, this agent has been used more or less spasmodically for similar purposes. In 1898, Kanthack showed that 0.3 to 0.36 parts of free chlorine in one hundred thousand parts of sewage effluent reduced the number of bacteria from innumerable to fifty per cubic centimetre.

Two years ago the first system for continuously purifying a municipal water supply by means of chlorine in the form of calcium hypochlorite was installed in the United States, the amount of available chlorine being 0.3 parts per million parts of water. The success of this method for one year has established its efficacy, and similar plants are now being installed at various other places. The method is so cheap, so efficient, and the agent used so harmless, that there would seem to be a great field for its usefulness in this and other countries. We have shown that 0.3 parts of chlorine in a million parts of water, or roughly, one pound of chloride of lime to a million pounds of water (500 tons or 100,000 gallons) will not only destroy typhoid and colon bacilli, but practically all bacteria in water except a few spore formers.

It is a valuable means of sterilizing water because chloride of lime may be bought almost anywhere, is very cheap in the infinitesimal quantity used, is not only absolutely harmless, but leaves no taste in the water, and with a few directions may be used by anyone to render an infected water safe for drinking purposes.

The writers have worked out a simple method which can be used by miners, prospectors, or campers in Northern Ontario, or elsewhere, to purify immediately and on the spot any water which may be dangerous to drink. For armies in the field such a method will prove invaluable, for every soldier could easily carry a couple of ounces of the chloride of lime and sterilize his own drinking water; hence the experience with enteric fever in South Africa need never be repeated.

The method is as follows:—

(1) Take a teaspoonful of chloride of lime, containing about one-third available chlorine, and remove the excess of powder by

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rolling a pencil or other round object along the top of the spoon, or by flattening it with a penknife blade, so that the excess will be squeezed off.

(2) Dissolve the teaspoonful of chloride of lime in a cupful of water, making sure that all lumps are thoroughly broken up, and to it, in any convenient receptacle, add three more cupfuls of water.

(3) Stir up the mixture, allow to stand for a few seconds in order to let any particles settle (this stock solution if kept in a tightly-stoppered bottle may be used for four or five days), and add one teaspoonful of this milky stock solution to two gallons of the water to be purified in a pail or other receptacle. Stir thoroughly in order that the weak chlorine solution will come into contact with all the bacteria, and allow to stand for ten minutes. This will give approximately one-half part of free chlorine to a million parts of water, and will effectually destroy all typhoid and colon bacilli, or other dysentery-producing bacilli in the water. The water will be without taste or odour, and the trace of free chlorine added rapidly disappears.

The writers have followed this procedure repeatedly, using only the simple apparatus mentioned, consisting of a teaspoon, a cup, and a 2-gallon pail. The water in the pail has been inoculated with typhoid and colon bacilli, and examined before and after chlorination. The result was invariably the same—namely, that all typhoid and colon bacilli were destroyed.

No.	Lake Ontario water Bacteria per c.c. at 20° C.	Lake Ontario water + typhoid bacilli Bacteria per c.c. at 37° C.	Lake Ontario water + typhoid + 1 part chlorine per million Bacteria per c.c. at 37° C.
1	92	2,144	1
2	84	26,100	1
3	176	15,000	6
4	154	17,000	2
	Substituting colon bacilli for typhoid—		
5	65	95	0
6	132	2,250	1

The method is also applicable to the sterilization of wells which have been infected, provided, of course, that the source of the infection has been removed. It would obviously be futile to sterilize a well situated in a farmyard from which organic matter and bacteria are constantly draining into the well.

If one knows the diameter and depth of the water in the well in feet, the amount of chloride of lime may be easily estimated. For instance, the writer wished to destroy the bacteria in the well at his summer cottage, the well being 6 ft. wide by 4 ft. deep. The formula would be radius squared × 22/7 × depth of the water = 3 × 3 × 22/7 × 4 = 113 cubic feet of water in the well. One cubic foot contains $6\frac{1}{4}$ gallons of water, so that there were 113 × $6\frac{1}{4}$ = about 700 gallons of water in the well.

One and a half pounds of chloride of lime to 100,000 gallons will give roughly one-half part of available chlorine in a million

parts of water, or 1 lb. to 66,000 gallons. Therefore, 700 ÷ 66,000 × 16 = 1/6 ounce chloride of lime was necessary to purify the well. The chloride of lime was mixed with water, diluted, and poured into the well, and then thoroughly mixed by plunging a long pole with a couple of strips of wood nailed across one end up and down in the water. The water before chlorination contained 950 bacteria per cubic centimetre with colon bacilli present; after chlorination there were only nine bacteria and no colon bacilli.

The water of Sturgeon Lake, which is a typical brown Northern Ontario water, was treated with one part of chlorine to a million parts of water according to the simple method outlined, with the result that the raw water count of 15,880 per c.c. was reduced to 8 per c.c.

Toronto Bay water taken from the slip at Aykroyd boat-house was chlorinated on the spot in a pail found in the boat-house, with the following results:—

Raw bay water	Colon bacilli	Chlorinated with 1 part chlorine per million	Chlorinated with 0.5 part chlorine per million	Colon bacilli
16,000 bacteria	Present	18 bacteria	—	Absent
25,000 ,,	,,	9 ,,	—	,,
18,000 ,,	,,	—	13 bacteria	,,

Another series was made to determine what amount of chlorine could be added to a water infected with typhoid and colon bacilli, which would show a decided excess of chlorine by the potassium iodide starch reaction, and yet not be detected by the senses of taste or smell.

Chlorine in parts per million	Taste	Odour	Typhoid, colon and other bacteria per c.c. at 37° C.	Iodide test after half an hour
0.0	None	None	5,452	None
0.5	,,	,,	0	Strong
0.33	,,	,,	0	,,
0.165	,,	,,	0	,,
0.125	,,	,,	0	Slight

This showed conclusively that more than 0.125 parts per million of free chlorine will destroy typhoid bacilli in Lake Ontario water if properly mixed, and that though the iodide test shows an excess of free chlorine in half an hour, not the slightest taste or odour could be detected by four laboratory workers in strengths up to 0.5 parts of free chlorine per million, when the taste became evident.

Fifteen different waters obtained from various points in Ontario and covering all the types found in the Province, were tested by the method outlined, in order to determine whether the large amount of organic matter present in some of the swamp waters would use up the available chlorine more rapidly than Lake Ontario water for example, and thus destroy the germicidal effect of the chlorine.

In one of the fifteen samples, which was a shallow surface well water containing hydrogen sulphide, there was no trace of free chlorine in ten minutes by the potassium iodide starch method. In one sample of a brown swamp water the chlorine could be detected by the senses of taste and smell. In all of the others there was an excess of chlorine, as demonstrated by the blue starch reaction after ten minutes, and yet the chlorine could not be detected by the senses.

We feel confident, therefore, that if the directions outlined are closely followed, there will be a sufficient quantity of chlorine added to destroy practically all bacteria without adding any foreign flavour to the water. If the taste is present the amount of stock solution added may be reduced until the taste just disappears without destroying the germicidal action of the chlorine.

Precautions to be observed:—

Chloride of lime deteriorates rapidly when kept in cardboard packages or exposed to air. If fresh from the factory it should contain about one-third available chlorine. Of six pound packages obtained at random from the shops, three were found of high strength, although the others would be suitable if more of the stock solution were used.

Manufacturer	Per cent. of available chlorine found.	Nature of package
Mendlesohn Sons, "Acme" ...	33.0 ...	Zinc
T. Eaton Drug Co.	32.5 ...	,,
Lyman's	29.1 ...	Cardboard, resin lined
Chemical Laboratories, Ltd. ...	21.7 ...	Cardboard
Moody's Royal	20.0 ...	,,
National Drug Co.	19.5 ..	,,

If the weak variety only is obtainable, then one and a half teaspoonfuls of the stock solution should be added to two gallons of water instead of one teaspoonful.

If the chloride of lime powder be kept in a tightly stoppered bottle it will retain its strength for a long period. The prospector would only need to carry two small bottles, one for the powder and one for the stock solution.

It is very important that the stock solution should be thoroughly mixed with the water to be purified, in order that no bacteria may escape the chlorine. The chlorine will not enter lumps or particles of organic matter, so that if such material, or salt or mud is present, it should be strained off or allowed to settle, and the clear water used for sterilizing.

Waters containing hydrogen sulphide must be given larger quantities of chlorine solution.—*Journal of the Royal Army Medical Corps.*

RABIES IN MAN.

By Dr. W. B. PROTHERO,

Johnstown, Pa.

The patient, a coal miner, visited the office of Dr. Keiper in Johnstown, Pa., September 28, 1911, complaining of illness, but apparently not of a serious nature. The doctor prescribed treatment and dismissed the case as nothing unusual. The following morning about 3 o'clock Dr. Keiper was called and found his patient bound with ropes and showing signs of violence. He suspected delirium tremens and ordered the man to be taken to the Johnstown City Hospital. The condition of the patient became worse and rabies was suspected. The patient had been bitten by a dog some weeks previous. The patient was about 28 years of age and bound by each wrist to a small iron bed.

The similarity of symptoms in man and animal were plainly shown. He assumed a sitting position, reaching each way as far as his bonds would permit, continual working of jaws apparently from spasmodic contractions of the muscles, some dribbling of saliva, attempts to bite were due to involuntary muscular contractions, eyes wide open, and a straight staring look. When a glass of water was held to his mouth he attempted, almost ravenously, to drink, but this effort brought on frightful paroxysms. Emissions of semen escaped from an erected penis. He had no knowledge of the nature of his disease, but at intervals would articulate a few words well and beseechingly request that he be killed. He seemed to understand what was said and gave his age correctly when asked to do so. He realized that the shackles that bound him were fastened with buckles and attempted to unfasten them. The voice was very much changed. The respirations were hurried and much aggravated during spasms. He was given sedatives in conjunction with chloroform inhalation. Death took place at six o'clock the following morning.—*American Veterinary Review.*

Personal.

A number of veterinary and medical friends of Dr. S. Brenton, of Detroit, U.S.A., recently gave a dinner in his honour as an appreciation of their pleasure at his election to the Presidentship of the American Veterinary Medical Association for the present year. They took advantage of the occasion to present him with a loving cup as a suitable memento of their feelings of good fellowship towards him, the presentation being made by a member of the medical profession. The gathering included veterinary surgeons well known equally in scientific agricultural work and in general practice, a tribute to his universal popularity in his own district.

Our congratulations to Professor Degive, of the Brussels Veterinary School, who has recently been promoted to the honour of "Commander of the Order of Leopold." It is, perhaps, looking a little ahead, but we hope that our learned colleague will make the personal acquaintance of many English veterinarians, to whom his name is already a household word, at the forthcoming International Congress, which is to be held in London in 1914.

M. Zwaenopoel has been appointed to a Professorship in the Brussels Veterinary School.

Professor Voit has been appointed "Dean" of the Munich Veterinary School.

At the meeting of the Hilo (Hawaiian Islands) Board of Trade, held a few days ago, a member of our profession, Mr. Harold B. Elliott, M.R.C.V.S., was elected President.

This is the second time Mr. Elliott has been elected to this position and, from the account given in the *Hawaii Herald*, it is evident that the selection of our *confrère* was a very popular one.

Some ten years ago a Society of Comparative Pathology was founded in Paris, its members consisting of medical men and veterinary surgeons, and a journal (*Revue de Pathologie Comparée*) records the work done at the meetings. In October of this year it has been decided to hold an International Congress of Comparative Pathology, and all members of the profession who are willing to take part, or attend, are invited to communicate with the Secretary, M. Grollet, 42, Rue de Ville, Paris.

Dr. Veranus A. Moore, the Director of the New York State Veterinary College, Cornell University, U.S.A., has been unanimously elected corresponding member of the "Société Centrale de Médecine Vétérinaire," of Paris.

Professor Dr. Wolffhuegel has been appointed Director of the Institute of Comparative Anatomy and Parasitology in the Veterinary School of Monte Video, South America.

Mr. W. J. Beart, M.R.C.V.S., whose death at King's Lynn has been recently reported at the age of 74, was one of the oldest Royal Warrant Holders in the country, having been appointed to the late Queen Victoria in 1863. In his younger days he saw service in the Crimea. His will was proved for £15,184.

MR. CLEMENT STEPHENSON, D.Sc., M.R.C.V.S., always a friend to matters pertaining to breeding and agriculture, has recently given £5,000 towards the proposed new Agricultural Department of the Durham University (Armstrong College), which is being established for advisory work amongst the farmers in the north-east of England. Mr. Stephenson's pet hobby has been the breeding of Polled Aberdeen Angus Cattle, on which breed he is one of the first authorities.

Reviews.

"SHEEP AND GOATS," by G. Mayall, M.R.C.V.S. Crown 8vo. Pp. x and 126, with 53 plates and figures. Published by Messrs. Baillière, Tindall and Cox, London. Price 3s. 6d. net.

This is a useful little book by the author of similar works on cattle and pigs, and is written in a popular style, mainly for small holders. The first eighty-eight pages are devoted to the sheep, and thirty-four to the goat, the remaining four pages being occupied by the index and a bibliography that may be found quite useful to those who wish to pursue further their quest for information on the subject matter of the manual.

The work opens with an extremely interesting history of the origin of the sheep, and a description of the main characters of present-day continental sheep, including amongst others the Larzac sheep, noted for its milk, which is used in the manufacture of Roquefort cheese. Then follows a brief account of British sheep, though some breeds, such as the "Clun," are omitted. Successive chapters deal with the dentition of sheep and goats; breeding and management during pregnancy; weaning and fattening of lambs; feeding; washing, shearing and dipping; and a brief description of many of the diseases of sheep. With regard to dentition, we disagree with the author, who gives three years and four years as the ages at which the lateral and corner permanent incisors respectively appear. It is quite common to find six broad teeth (permanent incisors) present at two and a half years, and a full mouth at three years. In describing the genital organs of the ram, no mention is made of the so-called vermiform appendix of the penis or prolongation of the urethra, beyond the erectile tissues, and which is essential to fertility. On page 60 the word "maw" is used as indicating the abomasum or fourth stomach. It is more often applied to the third stomach, the term "maw-bound," meaning impaction of the third stomach, being quite commonly used. On page 76, pseudo-tuberculosis is described as due to the *Bacillus pseudo-tuberculosis ovis*. In this country, in the commonest form, there is no difficulty in demonstrating the presence of the nematode worm, *Strongylus refescens*. The author might have more clearly distinguished between "ticks" and "keds" (kebs) on pp. 80 and 81.

The chapters on the goat follow similar lines to those on the sheep, with the very important addition of a chapter on "The

Milch Goat and Milking," and an excellent one on the housing of goats by Mr. S. H. Pegler, Secretary of the British Goat Society. As so much that was said of the sheep is also applicable to the goat, this section is necessarily shorter to avoid repetition. A concise reference is made to many of the diseases of goats, but it is unfortunate that no reference is made to the fact that the goat of Southern Europe is mainly responsible for the spread of "Mediterranean Fever" of man. The causal organism, the *Micrococcus melitensis*, may be present in considerable numbers in the milk of such goats, which, however, may not show evidence of any departure from perfect health. The numerous plates are excellently produced, and as most of them are reproductions of photographs of recent prize-winning sheep and goats, their presence enhances the value of the little book considerably.

FLEMING'S VETERINARY OBSTETRICS, including diseases and accidents incidental to pregnancy and parturition. Third edition, revised and modified by Professor J. F. Craig, M.A., M.R.C.V.S. Demy 8vo. Pp. viii and 526, with 161 illustrations. Published by Messrs. Baillière, Tindall and Cox, London. Price 15s. net.

"Fleming's Obstetrics" has long been known as the standard and only complete work in the English language on veterinary obstetrics, but its size and price always rendered it a too formidable book for the average student and practitioner. It contained much more matter than was required by the obstetrician, and which was dealt with in other standard works on physiology, anatomy, medicine and surgery. What was really wanted was a handy book at a moderate price, dealing, in a practical clinical manner, only with subjects which are of prime importance to the veterinary gynæcologist and accoucheur, and which are not so dealt with in other volumes. The new edition of Fleming's work, revised and practically re-written by Professor Craig, has supplied this want. He has omitted the superfluous material of the original work and has added a very considerable amount of recently acquired, up-to-date knowledge not found in any similar treatise, the sections on sterility, vaginitis and contagious abortion being some of the cases in point.

The omissions from the book comprise diseases of the mammary gland, diseases of young animals, and details which are not of indispensable importance, though it would probably have been better to have retained the former. The number of works consulted in editing the volume has resulted in its containing all that in the editor's opinion was worthy of being extracted from them. The illustrations are good and include many not published in the original work. In the section on dystokia several new instruments are illustrated and described, and some new methods of dealing with dystokia are inserted. The book is handsomely bound and of convenient size, and the printing is good, and the style in which it is written is free and pleasant to read.

DISEASES OF THE DOG AND THEIR TREATMENT, by Professor Dr. Georg Muller (Director of the Clinic for Small Animals at the Veterinary High School, Dresden), and Alexander Glass, A.M., V.S.McGill, Lecturer on Canine Pathology in the Veterinary Department, University of Pennsylvania. Third edition. Pp. 506, with 178 illustrations and 13 coloured plates. Price 25s. nett. Published by Messrs. Baillière, Tindall and Cox, Henrietta Street, London, W.C.

For a veterinary text-book to have reached a third edition is in itself a great compliment to the author, but to have reached this stage so rapidly, as has the subject of our revision, shows in addition how very much such a work has been needed and appreciated by the profession. Published originally in Germany, Dr. Muller's work on "Diseases of the Dog" was, although full of information on the subject and worthy to be termed a standard text-book, quite an unpretentious little volume when compared with the present third edition as translated, added to, and almost reconstructed, by Dr. Glass.

It is quite evident that the field of canine work is very much larger and more developed amongst the English speaking races than in Germany. So great was the demand for Glass's translation of Muller's "Diseases of the Dog" that it speedily passed into a second edition (still called "Muller," but with annotations by Glass), and now it is so revised and reconstructed to such an extent that it may legitimately be said that Muller and Glass are equally entitled to authorship; and, moreover, we notice that the publishers (Messrs. Baillière, Tindall, and Cox) are English. In the latter selection the authors are wise, for not only is there no country in the world where the dog is so much thought of and canine work carried out to such a nicety, but there are no publishers who know better the wants (and the way to supply them) than Messrs. Baillière, Tindall and Cox. The whole book teems with useful knowledge on the diseases of dogs, and it would be impossible to pick out any one particular portion to review more than another. Our advice is "Get it," as it is full of useful hints for every practitioner. It will not require a place on the bookshelf, it will much more likely be kept in the private consulting room, on the table, in a situation in which it is always at hand for reference.

NOTES ON SHOEING FOR HORSE OWNERS, by Captain V. H. Scratchley (late 60th Rifles). Pp. xv and 60, with 12 plates and numerous illustrations in the text. Published by Horace Cox, London. Price 3s. 6d. net.

This is a very excellent little book, and with, to us, a very novel method of make-up. It is intended primarily for horse owners, who ought reasonably to be expected to take a more thorough and rational interest in the manner in which their horses are shod. It does not deal in any way with the shoeing of abnormalities, such matters being regarded, and quite rightly,

as in the domain of the veterinary surgeon and so beyond the scope of the work. As the author states: "If the average horse owner would only learn more about and pay more attention to his horse's feet, he would be better able to appreciate the quality of the work done by farriers, and would then consider workmanship rather than the price charged or the distance of the forge from the stable."

Chapter I deals with "Preparation of the Foot"; Chapter II with "Fitting the Shoe"; Chapter III with "The Shoe"; Chapter IV with "Nailing On"; and Chapter V with the "Selection of a Shoe."

The peculiarity of the make-up consists in the placing of the main body of the text on the right-hand page throughout. There are numerous reference numbers, and the corresponding references are to be found on the left-hand pages and, as far as possible, opposite the numbers. The author's reason for this is that a general idea can first be obtained by reading the right-hand pages, and the details can be gone into subsequently. There is certainly something to be said for the system, and it is conceivable that we might like it better as we get more used to it.

Numerous references are made to Hunting's and to Dollar and Wheatley's classical works on horse shoeing, while the work of the former is freely quoted from, the author fully acknowledging his indebtedness for the permission to quote so fully.

We have no hesitation in recommending the book to horse owners, farmers, agriculturists and farriers.

The illustrations are well produced, the printing is good, though the type is rather too small for elderly readers, and the general make-up is very neat indeed.

Australia of To-day.

In the November number of "Australia of To-day" there is an interesting report of a recent scientific expedition through the Northern Territory, including a visit to Melville Island and Arnhem Land, the latter being the most northern portion of Australia. The expedition was under the command of Professor John Gilruth, the Principal of the University of Melbourne Veterinary School, and Professor Spencer.

It forms most interesting reading, giving opinions on the possibilities of sheep and cattle farming, and of wheat raising in these regions; and the photographs give an excellent idea of the districts through which the expedition passed.

Other articles are given, all excellently illustrated, showing the conditions of life in various parts of the continent, and all apparently hopefully imbued with the great possibilities for the future, if only labour and capital can be obtained to develop the resources. The magazine is published by Mason and Firth, Collins Street, Melbourne. Price 1s. 6d.

Translations.

PRIMARY SARCOMA OF THE RIGHT FRONTAL LOBE SURROUNDED BY SOFTENING OF THE BRAIN IN A HORSE.

The symptomatology of cerebral tumours in animals is still so little known that diagnosis is frequently doubtful, and certainty as to position and nature of lesions can only be acquired through autopsy. This diagnostic difficulty depends on many causes. Compared to the human brain, that of the animal has relatively simple functions. The intellectual symptoms, the localizing signs, the convulsive troubles are not clearly defined, and at best are only suggested. There is no recognition or tabulation of the general symptoms of cerebral tumours usual in man, such as cephalea, easy vomiting and constipation. Besides, the brain of an animal is much smaller than that of a man, so that a malignant tumour can spread more rapidly; hence the presence of symptoms indicative of diffuse rather than of localized lesions. Although great clinical progress has recently been made in human cerebral affections, it must be acknowledged that in cases of tumours in the head, diagnostic errors are still relatively frequent, so it is not surprising that similar errors are still more common in veterinary medicine. There is no recognized grouping of symptoms, no pathognomonic syndrome of cerebral tumours. The clinical indications that they induce are encountered in other brain diseases. There are even cases in which the beginning, the development and the termination of the illness are all such as to induce erroneous diagnosis. The following is an example:—

A horse attached to the 11th Regiment from the age of 5 to his 17th year, having up to that time been most serviceable. He had had glanders under the form of angina, with sub-lingual abscesses in 1897; his other infrequent ailments had been occasioned by unimportant wounds or kicks.

This horse had given every satisfaction, and as he was a good worker, always quiet and docile and regular in all his ways, he seemed likely to be employable for some time longer, in spite of his advanced age.

On June 6, 1910, during the morning grooming, being tied up outside the stable, he fell all at once in a state of collapse, and remained during ten minutes with his legs doubled up under his body and his nose pressed on the ground, his head being bowed down and his neck and shoulders rigidly curved and shaken by violent spasmodic contractions.

When the animal suddenly got up he appeared to be stiffened in a contraction of all his muscles. The head and shoulders were still rigid, but carried high, and the tail was forcibly extended. The limbs moved with difficulty, as if without joints. The body was sweating profusely. It was with great difficulty and with much coaxing that the patient was led, or rather supported, to the infirmary, where he was isolated.

After a rub-down, the horse gradually became calmer, and he moved more easily, but not altogether freely. Respiration and circulation were then about normal. The conjunctiva were slightly congested. On examination, the eye denoted nothing abnormal. The appetite was fairly good, though mastication and deglutition were somewhat sluggish. In fact, the most thorough examination failed to establish any definite diagnosis.

This somewhat torpid condition lasted a day and a night, but on the morrow there was a change. Paroxysms ensued almost incessantly, producing sudden heavy falls, leaps forward or sideways, and general or local contractions. The patient assumed the most unusual positions. He would remain half rearing, seeming to support himself against the wall, or he would put his feet into the manger, or he would push his head far over his right shoulder. In such strange attitudes he passed the greater part of the day. Finally, towards evening, a last fall stretched him in *decubitus lateralis* and he could not get up again. He died during the night, covered with contusions, seemingly attacked by paraplegia, the front legs alone being shaken up to the last moment by irregular and violent paroxysms.

The autopsy which took place five hours after death revealed grave lesions in the brain, as might have been expected.

The meninges were not noticeably altered; they had kept their suppleness, their colour, their independence, and their normal thickness; therefore, there was no meningitis. The cephalorachidian liquor was clear, yellowish, and not abundant. The cerebellum was slightly congested at the surface and at the fissure. At the anterior tiers of the right hemisphere the brain was interspersed with fine hæmorrhagic specks. The colour was greyish, the consistency soft. The transverse section of the right hemisphere showed the lateral ventricles to be normal, but the white substance of the right frontal lobe was greatly altered, its appearance being tumoral. There was great softening; dissection was most difficult, as the matter was liable to be crushed by the slightest pressure. The colour was slightly yellow, and flecked with fine petechia that, when confluent, appeared as lenticular spots that were distinctly hæmorrhagic. The bulb and the medulla presented their usual appearance. No other noteworthy particulars were disclosed by the autopsy.

Histologically examined, the tumour proved to be made up of elongated conjunctive cells with large nuclei imbricated one against the other, or in places slightly suggestive of vortices, enclosing corpuscles of blood. It was clearly a sarcoma. In places the neoplastic tissue was on the way to necrosis—a common result of sarcoma—and included elements that were not readily susceptible to coloration and were clearly in a deliquescent state. Round about the region of the tumour the blood-vessels of the brain showed intense perivascularity. The surrounding embryonic cells were greatly thickened. The neuroglia was, on the other hand, hyperplastic. Lastly, it was observed that between the neoplasmic surface and that of the brain there were foci of softening characterized, as is usual, by embryonic elements dispersed

through an opalescent liquid. Bacteriological examination of the fissures discovered no microbes at all. The pia mater presented in places slight embryonic infiltration. The cortex was decidedly sclerotic in certain regions. Several cortical vessels were attacked by periarteritis. The pyramidal cells showed a diffuse coloration when tested by Nissl's method. Several seats of capillary hæmorrhage were noted.

Thus, without any premonitory symptoms, a 17-year-old horse had a sudden apoplectic attack, with muscular spasms of the head and shoulders, followed by a state of generalized contracture. After a period of relative quiet lasting twenty-four hours, a state of agitation set in, with violent falls and contractures, sometimes local, sometimes general; loss of equilibrium or of ability to stand, or to keep the head still. Death occurred the same night. The *post-mortem* examination disclosed a tumour surrounded by a zone of recent softening with punctiform hæmorrhages scattered through neighbouring zones that were not softened.

With such a symptomatic table, and with such a rapid development of the malady, some acute cerebral trouble would naturally be thought of, but no definite diagnosis was indicated by any of the symptoms, and actually, though there was an acute affection, it was secondary to a latent cerebral neoplasm.

This case is instructive in several ways. It shows—a fact that is well known in human pathology—that a cerebral tumour can remain latent for a long time, suddenly manifesting itself in an apoplectic or epileptic attack, without any definite localizing symptoms. It is easy to supply the anatomical and clinical interpretation of these manifestations that are as rapid in their development as they are sudden in their appearance. In the case under consideration, the secondary lesions, that consisted in a zone of softening surrounding the tumour, seem to have played a predominant part in the clinical condition of the patient. A tumour can remain latent until it has caused acute softening of the brain, which complicates the development of the malady. In the encephalon, which is circumscribed by the non-extensible cranial case, circulation becomes imperfect and the ischemic perineoplastic zones soften; hence the exhibition of acute symptoms which the tumour of itself would not produce. The punctiform hæmorrhagic foci could equally be held responsible for the genesis of the disease; but they appear to the writer rather to be secondary to the congested state of the encephalon, which is present in subjects whose death is due to epileptic or apoplectic attacks. This hæmorrhage evidently contributes to and augments the gravity of the cerebral changes, and are not unconcerned with the rapidity of the fatal termination. The principal symptoms exhibited by our patient consisted in general contractures, with difficulty of standing and disordered agitation. These manifestations were not of a hemiplegic or of a monoplegic character; the lesion could not therefore be located in a particular hemisphere; although the changes were actually in the right hemisphere, they were so greatly extended that they exhibited generalized symptoms.

Besides, it is common in cerebral pathology for a local lesion to cause general convulsive trouble. This is to be explained by the inter-connections of the two hemispheres, which are bound together by the corpus callosum, and also by the fact of pressure by the tumoral hemisphere on the healthy one. But the curious symptoms observed in the above case depended certainly on the secondary lesions, which complicated the tumour, rather than on the existence of the latter, which was to a certain extent latent, as has been demonstrated.—*Recueil de Médecine Vétérinaire.*

PROLIFIC ANIMALS.

In the September number of the *Bulletin de Médecine Vétérinaire* our Belgian *confrère* Holemans reports the case of a Flemish sow who, from July 18, at 2 o'clock, to July 21, at 8 o'clock, gave birth to 23 pigs. They were very well developed and even rather larger than usual. Unfortunately, they died the following day, as the mother was exhausted by this prolonged labour, and was unable to nourish them. This sow had 14 teats. It was her fifth litter. The first had produced 16 little ones, the second 18, the third 14, and the fourth 18. The owner used to have her covered twice at an interval of two days.

In the November number of the *American Veterinary Review*, Peniston, a veterinary surgeon of Bermuda, mentions a Jersey cow who had one calf at her first three times of calving, and at her fourth produced two, and at her fifth and sixth three—that is to say, she had given birth to eleven calves in five years, eight of which were born during the last three years.—*Recueil de Médecine Vétérinaire.*

"KUREM" AND "KURIT."

A Chance not to be Missed.

In these days when everyone is looking for a cure for distemper, and, indeed, a universal cure for everything, the enclosed letter, which came through the post a short time ago, is worth a thought.

The "prospective" profits are so enormous that one is tempted to wonder why, when the capital needed is so small, the vendor should attempt to sell such a glittering bargain! And he only asks £500!!

Dear Sir,—I have two inventions I wish to sell, or accept Partner on each one of £500, and will give half share on all profits for this cash help No. 1 is Kureum Radical cure of Broken Knees and galls on horses; will cure when all other

remedies fail, full particulars of its Radical cure can be had of my agents, Messrs. ——— and Partner ——— London No. 2 is (Kurit) Radical cure of Distemper in dogs has never known a failure where I have used it myself, cost to make 2d pence a pint, 80 per cent profits on both of these inventions which do not require Patents only Registrations etc., no sample given or sent till after Registered, and should I put it on the market with a Partner, I shall state in advts none genuine only direct from me by Post, only Propiretors and makers, both thease are in constant demand at home and abroad amongst all horse keepers and dogs, etc., all offers you can make me shall be pleased to consider, yours Truly——

P.S.

Being advised to write to you by a gentleman who gave me your address, I have taken the liberty to do so as He stated you where the most likely to take the inventions up or know of Partner etc who will help me as I am only a working man and have no capital to put it on myself reason of selling or accepting a Partner, Yours Truly——

Letters and Communications, &c.

Dr. F. Attwood; Mr. Wellcome; Dr. Reynolds; Mr. Jamieson; Mr. Doyle; Mr. J. B. Buxton; Professor J. J. O'Connor; Mr. S. B. Vine; Mr. J. S. Wood; Khan Sahib Sayad Surdar Shah Gilani; Mr. H. Holterbach; Mr. Saszlo; Mr. L. E. W. Bevan.

Books and Periodicals, &c., Received.

Journal of the Royal Army Medical Corps; Recueil de Médecine Vétérinaire; L'Hygiène de la Viande et du Lait; Revue Générale de Médecine Vétérinaire; Der Tierärzt; Zeitschrift für Veterinärkunde; Berliner Tierärztliche Wochenschrift; Osterreichische Wochenschrift für Tierheilkunde; La Clinica Veterinaria; Revista de Medicina Veterinaria; Board of Agriculture and Fisheries; Department of Agriculture and Technical Instruction for Ireland; Kennel Gazette.

NOTE.—All communications should be addressed to 8, Henrietta Street, Covent Garden, London, W.C. Telephone, 4646 Gerrard. Telegrams, "Baillière, London."

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